United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with University of Nebraska, Conservation and Survey Division; Lower Big Blue Natural Resources District; Nemaha Natural Resources District; and Gage County Board of Commissioners

Soil Survey of Gage County, Nebraska

How To Use This Soil Survey

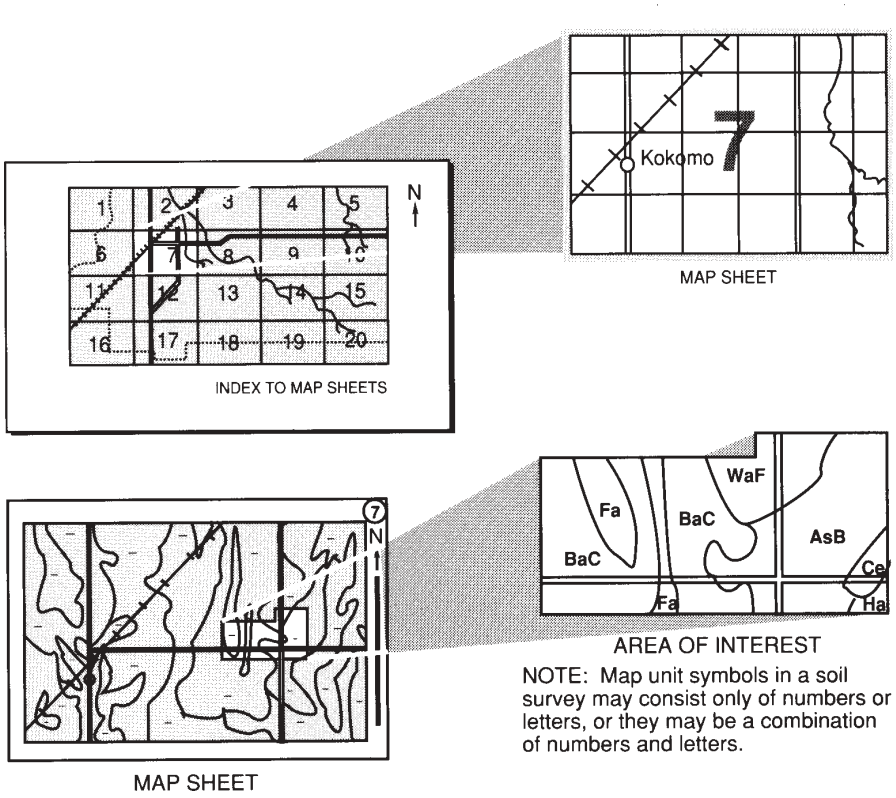
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



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

Major fieldwork for this soil survey was completed in 1999. Soil names and descriptions were approved in 2000. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2000. This survey was made cooperatively by the Natural Resources Conservation Service and the University of Nebraska, Conservation and Survey Division. It is part of the technical assistance furnished to the Lower Big Blue Natural Resources District, the Nemaha Natural Resources District, and the Gage County Board of Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Aerial photo of conservation practices in Gage County.

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

Contents

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

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State Conservationist
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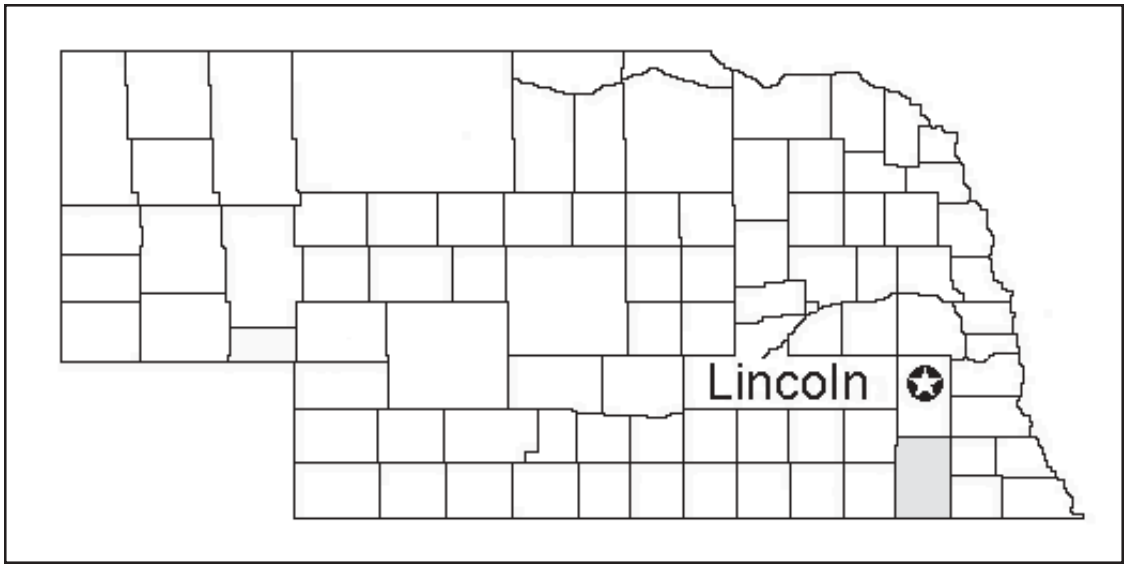

Location of Gage County in Nebraska.

Soil Survey of
Gage County, Nebraska

Fieldwork by Steven A. Scheinost, A. Tyler Labenz, and Mark E. Willoughby, Natural Resources Conservation Service, and Francis V. Belohlavy, University of Nebraska, Conservation and Survey Division

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the University of Nebraska, Conservation and Survey Division; the Lower Big Blue Natural Resources District; the Nemaha Natural Resources District; and the Gage County Board of Commissioners

Gage County is in the west-central part of Major Land Resource Area 106—Nebraska and Kansas Loess-Drift Hills, which is in the Central Feed Grains and Livestock Region (USDA, 1981). The county is in southeastern Nebraska. The total area of the county is about 860 square miles, or 550,188 acres. The county is bordered by Lancaster County to the north; Johnson and Pawnee Counties to the east; Saline and Jefferson Counties to the west; and Washington and Marshall Counties, Kansas, to the south.

General Nature of the County

The following paragraphs provide general information about Gage County. They describe physiography, relief, and drainage and the climate of the area.

In 1999, Gage County had an estimated population of 22,700. Beatrice, the largest town and the county seat, had an estimated population of 12,352.

The first soil survey of Gage County was published in 1916 (USDA, 1916); another was published in 1964 (USDA, 1964). This new survey updates the earlier surveys, provides additional information, contains maps that can be digitized for computer use, and presents the soils in more consistent detail.

About 72 percent of the county is used as cropland, and about 21 percent is used for pasture and rangeland. Less than 1 percent is forestland. The remaining area consists of farmsteads, towns, or water.

The principal crops, corn and soybeans, are grown successfully in nonirrigated and irrigated areas. Grain sorghum, wheat, and alfalfa are the other major crops in the county. These crops are used as feed for cattle and hogs and provide cash income. About 10 percent of the cropland is irrigated.

Most employment in Gage County is in agriculture or related business. Several industrial and manufacturing businesses in Beatrice provide economic income to the county.

An economic enterprise along the Big Blue River sells sand and gravel suitable for construction.

There are other incorporated towns in the county, which have services that are related to agriculture.

Physiography, Relief, and Drainage

There are two major physiographic divisions in Gage County—the uplands, which formed in loess and glacial till; and the flood plain soils that formed in recent alluvium of the Big Blue and Middle Branch Big Nemaha Rivers and the Big Indian, Bear, Clatonia, and Hooker Creeks and their tributaries. The underlying formations are interbedded limestone and shale.

The highest elevation is near Cortland in the northern part of the county at a point south of Barneston, where the Big Blue River crosses the Kansas-Nebraska border. The general slope of Gage County is toward the southeast.

The majority of upland soils are moderately well drained, and the relief is dominantly nearly level to very steep. The most extensive nearly level uplands are in the vicinities of Cortland and Ellis, but several smaller areas are near Virginia, north and south of Odell, north of Filley, and elsewhere over the county on top of major loess-capped divides. Uplands of

glacial till and bedrock are gently sloping to steep or very steep. The sloping glacial uplands are most common near Adams, Clatonia, Liberty, and Barneston. The areas of strongest relief are in the bedrock uplands near Krider, Rockford, Wymore, and Blue Springs and elsewhere along the more deeply entrenched streams. The area of strongest relief is southeast of Beatrice. From the top of Iron Mountain—a prominent sandstone outcrop—to the flood plains of the Big Blue River, the elevation changes several hundred feet within a distance of less than one-half mile. The flood plains and strips of terraces are nearly level and range in width from a few rods along the smaller streams to 3 miles along the Big Blue and Big Nemaha Rivers.

Drainage is chiefly southeastward through the Big Blue River and its principal tributaries: Big Indian, Bear, and Clatonia Creeks. The Middle Branch Big Nemaha River drains the northeast corner of the county and its principal tributary is Hooker Creek.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Beatrice in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 27.8 degrees F and the average daily minimum temperature is 17.3 degrees. The lowest temperature on record, which occurred at Beatrice on December 22, 1983, was -21 degrees. In summer, the average temperature is 76.5 degrees and the average daily maximum temperature is 88.5 degrees. The highest temperature, which occurred at Beatrice on July 14, 1954, was 114 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation is 30.24 inches. Of this, 24.2 inches, or 80 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.15 inches at Beatrice on September 26, 1973. Thunderstorms occur on about 46 days each year, and most occur between May and August.

The average seasonal snowfall is 26.6 inches. The greatest snow depth at any one time was 28 inches recorded on March 16, 1960. On the average, 44 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 13 inches recorded on February 15, 1969.

The average relative humidity in midafternoon is about 56 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 72 percent of the time possible in summer and 56 percent in winter. The prevailing wind is from the north in the winter and early spring (January to April) and from the south in all other months. Average windspeed is highest, over 12 miles per hour, in March and April.

How This Survey Was Made

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

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

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of

the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

Detailed Soil Map Units

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

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils 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 minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components 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 minor components 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 landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, 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, slope, stoniness, salinity, 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, Wymore silty clay loam, 2 to 5 percent slopes, is a phase of the Wymore series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Cortland-Malmo complex, 6 to 12 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, sand and gravel, is an example.

In the descriptions, “LEP” means linear extensibility percent.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see Contents) 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.

1849—Burchard clay loam, 2 to 6 percent slopes

Map Unit Composition

Burchard: 85 percent
Minor components: 15 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Summits and shoulders
Parent material: Calcareous till
Slope: 2 to 6 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
A—0 to 13 inches; clay loam
Bt—13 to 19 inches; clay loam
Btk—19 to 29 inches; clay loam
Bk—29 to 37 inches; clay loam
C—37 to 60 inches; clay loam

Similar soils: Soils that have a thinner surface layer; soils that have carbonates above a depth of 12 inches; soils that have 6 to 18 inches of loess on the surface

Minor components

Wymore
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Malmo
Phase: Severely eroded
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

- Areas of this map unit are typically small and occur in the higher positions on the landform.
- Most of the acreage of this unit is used for cultivated crops. Corn, soybeans, and grain sorghum are the main crops. The hazard of water erosion can be controlled by contour farming, terraces, and conservation tillage.

1873—Burchard-Steinauer clay loams, 6 to 12 percent slopes, eroded

Map Unit Composition

Burchard: 50 percent
Steinauer: 35 percent
Minor components: 15 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous till
Slope: 6 to 12 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
A—0 to 13 inches; clay loam
Bt—13 to 19 inches; clay loam
Btk—19 to 29 inches; clay loam
Bk—29 to 37 inches; clay loam
C—37 to 60 inches; clay loam

Similar soils: Soils that have carbonates above a depth of 12 inches or below a depth of 30 inches; soils that contain more clay in the particle-size control section

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous loamy till
Slope: 6 to 12 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; clay loam
AC—6 to 15 inches; clay loam
C1—15 to 41 inches; clay loam
C2—41 to 60 inches; clay loam

Similar soils: Soils that have carbonates lower in the profile; soils that contain more clay in the particle-size control section

Minor components

Morrill
Extent: About 8 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Malmo
Phase: Severely eroded
Extent: About 7 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• More than half of the acreage of this unit is used for cultivated crops or has been reseeded to native grasses. The remaining acreage is used for pasture or rangeland. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage.

1879—Burchard-Steinauer clay loams, 12 to 18 percent slopes, eroded

Map Unit Composition

Burchard: 45 percent
Steinauer: 40 percent
Minor components: 15 percent

Component Descriptions

Burchard

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous till
Slope: 12 to 18 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
A—0 to 13 inches; clay loam
Bt—13 to 19 inches; clay loam
Btk—19 to 29 inches; clay loam
Bk—29 to 37 inches; clay loam
C—37 to 60 inches; clay loam

Similar soils: Soils that have carbonates above a depth of 12 inches or below a depth of 30 inches; soils that have more clay in the particle-size control section

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous loamy till
Slope: 12 to 18 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet

Runoff class: High
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; clay loam
AC—6 to 15 inches; clay loam
C1—15 to 41 inches; clay loam
C2—41 to 60 inches; clay loam

Similar soils: Soils that have carbonates lower in the profile; soils that contain more clay in the particle-size control section

Minor components

Morrill
Extent: About 9 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 18 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Malmo
Phase: Severely eroded
Extent: About 6 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• Most of the acreage of this unit has been reseeded to native grasses or is used for pasture or rangeland. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage.

1930—Butler silt loam, 0 to 1 percent slopes

Map Unit Composition

Butler: 92 percent
Minor components: 8 percent

Component Descriptions

Butler

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Swales on broad interstream divides on uplands
Hillslope position: Summits
Parent material: Loess
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 10.1 inches)
Shrink-swell potential: Very high (about 10.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 6 to 18 inches
Runoff class: Very low
Ecological site: Clayey; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 6 inches; silt loam
A—6 to 10 inches; silt loam
E—10 to 12 inches; silt loam
Bt1—12 to 25 inches; silty clay
Bt2—25 to 34 inches; silty clay
BC—34 to 43 inches; silty clay loam
C—43 to 60 inches; silty clay loam

Similar soils: Soils that contain more clay in the surface layer

Minor components

Fillmore
Extent: About 5 percent of the unit
Landform: Playas on broad interstream divides
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Wymore
Extent: About 3 percent of the unit
Landform: Broad interstream divides on uplands
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• In most years this soil is saturated from a depth of about 6 inches to 24 inches below the surface by a seasonal high water table during part of the growing season.
• Most of the acreage of this unit is used for cultivated crops. Corn, soybeans, and grain sorghum are the major crops. Wetness is a problem in most years.

2076—Chase silty clay loam, 0 to 1 percent slopes, rarely flooded

Map Unit Composition

Chase: 85 percent
Minor components: 15 percent

Component Descriptions

Chase

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty and clayey alluvium
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Slow (about 0.06 inch per hour)
Available water capacity: High (about 9.9 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding frequency: Rare
Depth to seasonal zone of saturation: About 24 to 48 inches
Runoff class: Low
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 9 inches; silty clay loam
BA—9 to 19 inches; silty clay loam
Bt1—19 to 30 inches; silty clay
Bt2—30 to 41 inches; silty clay
BC—41 to 47 inches; silty clay loam
C—47 to 80 inches; silty clay loam

Similar soils: Soils that have a silt loam surface layer; soils that do not have an argillic horizon

Minor components

Kennebec
Phase: Rarely flooded
Extent: About 12 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Muscotah
Extent: About 3 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland

General Considerations

• This map unit occurs in the slightly higher positions on the flood plain.
• Most of the acreage of this unit is used for cultivated crops. Major crops are corn, soybeans, and grain sorghum. In some years, wetness is a problem in the spring.

2201—Cortland-Malmo complex, 6 to 12 percent slopes

Map Unit Composition

Cortland: 55 percent
Malmo: 25 percent
Minor components: 20 percent

Component Descriptions

Cortland

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Outwash and/or loamy till
Slope: 6 to 12 percent
Percent of surface covered by rock fragments: About 0 to 2 percent (coarse rounded gravel)
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: Moderate (about 8.0 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 15 inches; clay loam
Bt2—15 to 28 inches; clay loam
BC—28 to 36 inches; sandy loam
2C1—36 to 40 inches; loamy sand
2C2—40 to 50 inches; loamy sand
2C3—50 to 80 inches; loamy sand

Similar soils: Soils that have a dark surface layer more than 10 inches thick; soils that contain more sand and less clay in the particle-size control section; soils that were previously mapped as Morrill, severely eroded

Malmo

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Weathered till
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)

Available water capacity: Moderate (about 8.1 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Very high
Ecological site: Clayey; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; clay loam
Bt1—6 to 15 inches; clay
Bt2—15 to 25 inches; clay
Bt3—25 to 39 inches; clay
Bt4—39 to 43 inches; gravelly clay
BC—43 to 54 inches; clay loam
C—54 to 80 inches; loam

Similar soils: Soils that have carbonates at a shallower depth; soils that have 6 to 18 inches of loess on the surface; soils that have a dark surface layer more than 10 inches thick; soils that were previously mapped as Mayberry, severely eroded

Minor components

Otoe
Phase: Severely eroded
Extent: About 20 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 11 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• Pebbles, cobblestones, and sand outcrops are common on the surface in most areas.
• About half of the acreage of this unit is used for cultivated crops or has been reseeded to native grasses. The remaining acreage is used for pasture or rangeland. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage.

2418—Deroin silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Deroin: 85 percent
Minor components: 15 percent

Component Descriptions

Deroin

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Summits and shoulders
Parent material: Loess
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 7 inches; silty clay loam
Bt1—7 to 12 inches; silty clay loam
Bt2—12 to 18 inches; silty clay loam
Bt3—18 to 40 inches; silty clay loam
BC—40 to 50 inches; silty clay loam
C—50 to 80 inches; silty clay loam

Similar soils: Soils that have a dark surface layer more than 10 inches thick; soils that contain more clay in the particle-size control section

Minor components

Malmo
Phase: Severely eroded
Extent: About 8 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Wymore
Extent: About 7 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• The Deroin soil formed in Loveland loess.
• Most of the acreage of this unit is used for cultivated crops, and the rest is used for pasture or rangeland.

Grain sorghum, corn, and soybeans are the principal crops. The hazard of water erosion can be controlled by contour farming, terraces, and conservation tillage.

2420—Deroin silty clay loam, 5 to 11 percent slopes

Map Unit Composition

Deroin: 90 percent
Minor components: 10 percent

Component Descriptions

Deroin

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Loess
Slope: 5 to 11 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 7 inches; silty clay loam
Bt1—7 to 12 inches; silty clay loam
Bt2—12 to 18 inches; silty clay loam
Bt3—18 to 40 inches; silty clay loam
BC—40 to 50 inches; silty clay loam
C—50 to 80 inches; silty clay loam

Similar soils: Soils that formed in yellowish brown loess; soils that have a dark surface layer more than 10 inches thick; soils that contain more clay in the particle-size control section

Minor components

Malmo
Phase: Severely eroded
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

- The Deroin soil formed in Loveland loess.
- Most of the acreage of this unit is used for cultivated crops. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage.

2695—Edalgo silty clay loam, 8 to 20 percent slopes

Map Unit Composition

Edalgo: 80 percent
Minor components: 20 percent

Component Descriptions

Edalgo

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Residuum derived from clayey shale
Slope: 8 to 20 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Low (about 4.5 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Clayey; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
A1—0 to 4 inches; silty clay loam
A2—4 to 8 inches; silty clay loam
Bt—8 to 28 inches; clay
Cr—28 to 40 inches; weathered bedrock

Similar soils: Soils that are less than 20 inches deep to shale

Minor components

Padonia
Extent: About 15 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Clay Upland

Hedville
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 30 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Sandy; Veg. Zone 4

General Considerations

• The Edalgo soil formed in Fuson shale in the Dakota Formation of Cretaceous material.
• Most of the acreage of this unit is used for pasture or rangeland.

2832—Filley fine sandy loam, 6 to 12 percent slopes

Map Unit Composition

Filley: 95 percent
Minor components: 5 percent

Component Descriptions

Filley

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Coarse-loamy glaciofluvial deposits
Slope: 6 to 12 percent
Drainage class: Well drained
Slowest permeability: Moderately rapid (about 2.00 inches per hour)
Available water capacity: Moderate (about 6.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Low
Ecological site: Sandy; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; fine sandy loam
AB—6 to 12 inches; fine sandy loam
Bw—12 to 23 inches; fine sandy loam
BC—23 to 30 inches; fine sandy loam
C—30 to 80 inches; loamy fine sand

Similar soils: Soils that have a sandy loam or loamy sand surface layer

Minor components

Cortland
Phase: Severely eroded
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• In some areas, a few stones and boulders are on the surface.
• Most of the acreage of this unit supports native grass or has been reseeded to grass and is used for pasture or mowed for hay. The hazard of water erosion is severe.

2833—Filley fine sandy loam, 12 to 18 percent slopes

Map Unit Composition

Filley: 90 percent
Minor components: 10 percent

Component Descriptions

Filley

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Coarse-loamy glaciofluvial deposits
Slope: 12 to 18 percent
Drainage class: Well drained
Slowest permeability: Moderately rapid (about 2.00 inches per hour)
Available water capacity: Moderate (about 6.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Low
Ecological site: Sandy; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; fine sandy loam
AB—6 to 12 inches; fine sandy loam
Bw—12 to 23 inches; fine sandy loam
BC—23 to 30 inches; fine sandy loam
C—30 to 80 inches; loamy fine sand

Similar soils: Soils that have a sandy loam or loamy sand surface layer

Minor components

Morrill
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 18 percent

Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• In some areas, a few stones and boulders are on the surface.
• Most of the acreage of this unit supports native grass or has been reseeded to grass and is used for pasture or mowed for hay.

2863—Fluvaquents, silty, frequently flooded

Map Unit Composition

Fluvaquents: 95 percent
Minor components: 5 percent

Component Descriptions

Fluvaquents

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Depressions on flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Slowest permeability: Slow (about 0.06 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Frequent
Ponding frequency: Frequent
Seasonal zone of saturation: At the surface
Runoff class: Negligible
Land capability (nonirrigated): 8w

Typical profile:
A—0 to 20 inches; silty clay
C—20 to 80 inches; stratified with various textures

Similar soils: Soils that have a loamy or sandy surface layer

Minor components

Kezan
Phase: Frequently flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

General Considerations

• Areas of open water more than 6 inches deep are common in some places.
• All of the acreage of this unit is used for wetland wildlife habitat.

3422—Hedville cobbly loam, 6 to 30 percent slopes

Map Unit Composition

Hedville: 80 percent
Minor components: 20 percent

Component Descriptions

Hedville

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Shoulders and backslopes
Parent material: Residuum derived from sandstone
Slope: 6 to 30 percent
Percent of surface covered by rock fragments: About 1 to 5 percent (subangular channers)
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very low (about 2.0 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Shallow Sandy; Veg. Zone 4
Land capability (nonirrigated): 6s

Typical profile:
A—0 to 10 inches; cobbly loam
C—10 to 16 inches; cobbly loam
R—16 to 22 inches; bedrock

Similar soils: Soils that have a surface layer of loam or fine sandy loam

Minor components

Lancaster
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Rock outcrop
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands

Slope: 11 to 30 percent
Ecological site: No Site; Veg. Zone 4

General Considerations

• The Hedville soil formed in residuum derived from noncalcareous sandstone of the Dakota Formation. Sandstone fragments on the surface are common in some areas.
• All of the acreage of this unit is used for pasture or rangeland.

4106—Judson silt loam, 2 to 5 percent slopes

Map Unit Composition

Judson: 90 percent
Minor components: 10 percent

Component Descriptions

Judson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Footslopes
Parent material: Fine-silty colluvium
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 13.0 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
Ap1—0 to 6 inches; silt loam
Ap2—6 to 12 inches; silty clay loam
A1—12 to 22 inches; silty clay loam
A2—22 to 31 inches; silty clay loam
AB—31 to 43 inches; silty clay loam
Bw1—43 to 54 inches; silty clay loam
Bw2—54 to 69 inches; silty clay loam
Bw3—69 to 80 inches; silty clay loam

Similar soils: Soils that contain more clay in the particle-size control section; soils that have a surface layer of loam; soils that have a dark surface layer less than 24 inches thick

Minor components

Nodaway
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

General Considerations

• Areas of this map unit are typically long and narrow.
• Most of the acreage of this unit is used for cultivated crops. Corn, soybeans, and grain sorghum are the principal crops.

4210—Kennebec silt loam, 0 to 1 percent slopes, rarely flooded, cool

Map Unit Composition

Kennebec: 85 percent
Minor components: 15 percent

Component Descriptions

Kennebec

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 13.3 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Rare
Depth to seasonal zone of saturation: About 42 to 60 inches
Runoff class: Negligible
Ecological site: Silty Overflow; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
Ap—0 to 10 inches; silt loam
A1—10 to 19 inches; silt loam
A2—19 to 45 inches; silt loam
A3—45 to 56 inches; silty clay loam
AC—56 to 70 inches; silty clay loam
C—70 to 80 inches; silty clay loam

Similar soils: Soils that have a stratified surface horizon; soils that contain more clay in the particle-size control section

Minor components

Judson
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Kennebec
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

General Considerations

• This map unit occurs in the slightly higher positions on the flood plain.
• Most of the acreage of this unit is used for cultivated crops. Major crops are corn, soybeans, and grain sorghum.

4232—Kennebec silt loam, 0 to 1 percent slopes, occasionally flooded, cool

Map Unit Composition

Kennebec: 90 percent
Minor components: 10 percent

Component Descriptions

Kennebec

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 13.3 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Occasional
Depth to seasonal zone of saturation: About 42 to 60 inches
Runoff class: Negligible
Ecological site: Silty Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 10 inches; silt loam
A1—10 to 19 inches; silt loam
A2—19 to 45 inches; silt loam
A3—45 to 56 inches; silty clay loam
AC—56 to 70 inches; silty clay loam
C—70 to 80 inches; silty clay loam

Similar soils: Soils that have a stratified surface layer; soils that are only rarely flooded

Minor components

Muscotah
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Loamy Lowland

General Considerations

• This map unit occurs in large, wide areas on the flood plain.
• Most of the acreage of this unit is used for cultivated crops. Major crops are corn, soybeans, and grain sorghum.

4281—Kezan silt loam, 0 to 2 percent slopes, channeled, frequently flooded

Map Unit Composition

Kezan: 85 percent
Minor components: 15 percent

Component Descriptions

Kezan

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Drainageways on uplands
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 12.0 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Frequent
Depth to seasonal zone of saturation: About 0 to 18 inches
Runoff class: Negligible
Ecological site: Wet Subirrigated; Veg. Zone 4
Land capability (nonirrigated): 6w

Typical profile:
A—0 to 6 inches; silt loam
C—6 to 13 inches; stratified silt loam
Cg1—13 to 19 inches; stratified silt loam
Cg2—19 to 32 inches; stratified silt loam
Agb1—32 to 44 inches; stratified silt loam
Agb2—44 to 60 inches; stratified silt loam

Minor components

Kezan
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

Fluvaquents
Extent: About 3 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 1 percent
Drainage class: Very poorly drained

Judson
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

- This map unit is dissected by a meandering stream channel.
- Most of the acreage of this unit supports native grass and trees and is used for pasture or wildlife habitat.

4287—Kezan silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Kezan: 85 percent
Minor components: 15 percent

Component Descriptions

Kezan

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Drainageways on uplands
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 12.0 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal zone of saturation: About 0 to 18 inches
Runoff class: Negligible
Ecological site: Wet Subirrigated; Veg. Zone 4
Land capability (nonirrigated): 5w

Typical profile:
A—0 to 6 inches; silt loam
C—6 to 13 inches; stratified silt loam
Cg1—13 to 19 inches; stratified silt loam
Cg2—19 to 32 inches; stratified silt loam
Agb1—32 to 44 inches; stratified silt loam
Agb2—44 to 60 inches; stratified silt loam

Minor components

Nodaway
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Kezan
Phase: Channeled
Extent: About 3 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

Judson
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

- Sediment eroded from soils in the higher positions can collect in the vegetation and increase the thickness of the surface layer.
- Most of the acreage of this init is used for pasture or hayland.

4298—Kipson-Sogn complex, 3 to 30 percent slopes

Map Unit Composition

Kipson: 50 percent
Sogn: 45 percent
Minor components: 5 percent

Component Descriptions

Kipson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Silty and clayey residuum derived from calcareous shale

Slope: 3 to 30 percent
Percent of surface covered by rock fragments: About 2 to 6 percent (very angular channers)
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Low (about 3.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Shallow Limy; Veg. Zone 4
Land capability (nonirrigated): 6s

Typical profile:
A—0 to 9 inches; channery silty clay loam
AC—9 to 17 inches; channery silty clay loam
Cr—17 to 36 inches; bedrock

Similar soils: Soils that are moderately deep to shale and limestone; soils that are not calcareous in the surface layer

Sogn

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Shoulders
Parent material: Residuum derived from limestone
Slope: 3 to 18 percent
Percent of surface covered by rock fragments: About 2 to 10 percent (angular flagstones)
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very low (about 1.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Shallow Limy; Veg. Zone 4
Land capability (nonirrigated): 6s

Typical profile:
A—0 to 4 inches; clay loam
AC—4 to 8 inches; clay loam
R—8 to 12 inches; unweathered bedrock

Similar soils: Soils that are moderately deep to limestone

Minor components

Rock outcrop
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 10 to 30 percent
Ecological site: No Site; Veg. Zone 4

General Considerations

- These extent of the components in this unit may vary, depending on slope and on hillslope position.
- All of the acreage of this unit is used for pasture or range. In some areas, shrubs and trees have been allowed to grow in order to encourage wildlife habitation.

4300—Kipson-Sogn-Rock outcrop complex, 12 to 60 percent slopes

Map Unit Composition

Kipson: 50 percent
Sogn: 35 percent
Rock outcrop: 15 percent

Component Descriptions

Kipson

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Silty and clayey residuum derived from calcareous shale
Slope: 12 to 60 percent
Percent of surface covered by rock fragments: About 2 to 6 percent (very angular channers)
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Low (about 3.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Shallow Limy; Veg. Zone 4
Land capability (nonirrigated): 7s

Typical profile:
A—0 to 9 inches; channery silty clay loam
AC—9 to 17 inches; channery silty clay loam
Cr—17 to 36 inches; bedrock

Similar soils: Soils that are moderately deep to shale and limestone; soils that are not calcareous in the surface layer

Sogn

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Residuum derived from limestone
Slope: 12 to 45 percent
Percent of surface covered by rock fragments: About 2 to 10 percent (angular flagstones)
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very low (about 1.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Shallow Limy; Veg. Zone 4
Land capability (nonirrigated): 7s

Typical profile:
A—0 to 4 inches; clay loam
AC—4 to 8 inches; clay loam
R—8 to 12 inches; unweathered bedrock

Similar soils: Soils that are moderately deep to limestone

Rock outcrop

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Limestone and sandstone
Slope: 12 to 150 percent
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Very high
Ecological site: No Site; Veg. Zone 4
Land capability (nonirrigated): 8s

General Considerations

- The extent of the components in this unit may vary, depending on slope and on hillslope position.
- All of the acreage of this unit is used for pasture or range. In some areas, shrubs and trees have been allowed to grow in order to encourage wildlife habitation.

4428—Lancaster loam, 2 to 6 percent slopes

Map Unit Composition

Lancaster: 80 percent
Minor components: 20 percent

Component Descriptions

Lancaster

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes and shoulders
Parent material: Sandy residuum derived from sandstone and shale
Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
A1—0 to 8 inches; loam
A2—8 to 12 inches; loam
Bt—12 to 21 inches; clay loam
C—21 to 33 inches; loam
Cr—33 to 40 inches; weathered bedrock

Similar soils: Soils that have a surface layer of sandy loam or fine sandy loam; soils that have a C horizon of sandy loam or fine sandy loam

Minor components

Hedville
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Sandy; Veg. Zone 4

Kipson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 17 percent

Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Limy; Veg. Zone 4

Wymore
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• The Lancaster soil formed in residuum derived from noncalcareous sandstone of the Dakota Formation.
• Most of the acreage of this unit is used for pasture or rangeland.

4429—Lancaster loam, 6 to 12 percent slopes

Map Unit Composition

Lancaster: 80 percent
Minor components: 20 percent

Component Descriptions

Lancaster

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Sandy residuum derived from sandstone and shale
Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
A1—0 to 8 inches; loam
A2—8 to 12 inches; loam
Bt—12 to 21 inches; clay loam
C—21 to 33 inches; loam
Cr—33 to 40 inches; weathered bedrock

Similar soils: Soils that have a surface layer of sandy loam or fine sandy loam; soils that have a C horizon of sandy loam or fine sandy loam

Minor components

Hedville
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Sandy; Veg. Zone 4

Kipson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 17 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Limy; Veg. Zone 4

Sogn
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 20 percent
Depth to restrictive feature: 4 to 20 inches to bedrock (lithic)
Drainage class: Somewhat excessively drained

General Considerations

• The Lancaster soil formed in residuum derived from noncalcareous sandstone of the Dakota Formation.
• Most of the acreage of this unit is used for pasture or rangeland.

4858—Malmo clay loam, 2 to 6 percent slopes

Map Unit Composition

Malmo: 85 percent
Minor components: 15 percent

Component Descriptions

Malmo

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Shoulders and summits
Parent material: Weathered till
Slope: 2 to 6 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)

Available water capacity: Moderate (about 8.1 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Very high
Ecological site: Clayey; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 6 inches; clay loam
Bt1—6 to 15 inches; clay
Bt2—15 to 25 inches; clay
Bt3—25 to 39 inches; clay
Bt4—39 to 43 inches; gravelly clay
BC—43 to 54 inches; clay loam
C—54 to 80 inches; loam

Similar soils: Soils that have carbonates above a depth of 15 inches; soils that have 6 to 18 inches of loess on the surface; soils that have a dark surface layer more than 10 inches thick; soils that were previously mapped as Mayberry, severely eroded

Minor components

Morrill
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 6 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Wymore
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

- Some areas of this unit have pebbles or stones on the surface.
- About half of the acreage of this unit is used for cultivated crops, and the rest is used for pasture or rangeland. The hazard of water erosion can be controlled by contour farming, terraces, and conservation tillage.

4864—Malmo-Pawnee complex, 6 to 12 percent slopes

Map Unit Composition

Malmo: 60 percent
Pawnee: 30 percent
Minor components: 10 percent

Component Descriptions

Malmo

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Weathered till
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 8.1 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Very high
Ecological site: Clayey; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; clay loam
Bt1—6 to 15 inches; clay
Bt2—15 to 25 inches; clay
Bt3—25 to 39 inches; clay
Bt4—39 to 43 inches; gravelly clay
BC—43 to 54 inches; clay loam
C—54 to 80 inches; loam

Similar soils: Soils that contain carbonates at a shallower depth; soils that have 6 to 18 inches of loess on the surface; soils that have a dark surface layer more than 10 inches thick; soils that were previously mapped as Mayberry, severely eroded

Pawnee

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Clayey till
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 7.3 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: High
Ecological site: Clayey; Veg. Zone 4

Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; clay loam
A—6 to 10 inches; clay loam
BA—10 to 14 inches; clay loam
Bt1—14 to 24 inches; clay
Bt2—24 to 32 inches; clay
Bt3—32 to 45 inches; clay
BC—45 to 53 inches; clay
C—53 to 80 inches; clay loam

Similar soils: Soils that have a thinner surface horizon; soils that contain carbonates at a shallower depth; soils that have 6 to 18 inches of loess on the surface

Minor components

Otoe
Phase: Severely eroded
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 11 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• Some areas of this unit have pebbles or stones on the surface.
• More than half of the acreage of this unit is used for cultivated crops. The remaining acreage has been reseeded to native grasses and is used for pasture or rangeland. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage. In most years, wetness is a problem in the spring.

5397—Morrill loam, 12 to 18 percent slopes

Map Unit Composition

Morrill: 80 percent
Minor components: 20 percent

Component Descriptions

Morrill

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Loamy till or outwash
Slope: 12 to 18 percent
Percent of surface covered by rock fragments: About 0 to 2 percent (coarse rounded gravel)
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 9.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; loam
BA—6 to 12 inches; loam
Bt1—12 to 22 inches; loam
Bt2—22 to 30 inches; sandy clay loam
Bt3—30 to 35 inches; sandy clay loam
Bt4—35 to 43 inches; sandy clay loam
BC—43 to 52 inches; fine sandy loam
2C1—52 to 59 inches; fine sandy loam
2C2—59 to 73 inches; loamy fine sand
2C3—73 to 80 inches; sand

Similar soils: Soils that have a thinner surface layer; soils that have various textures below a depth of 40 inches

Minor components

Cortland
Phase: Severely eroded
Extent: About 8 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Filley
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 18 percent
Drainage class: Somewhat excessively drained

Malmo
Phase: Severely eroded
Extent: About 4 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Steinauer
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 18 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Pebbles, cobblestones, and sand and gravel outcrops are common on the surface.
• Most of the acreage of this unit is used for pasture or has been reseeded to native grasses.

5480—Muscotah silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Composition

Muscotah: 90 percent
Minor components: 10 percent

Component Descriptions

Muscotah

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding frequency: Occasional
Depth to seasonal zone of saturation: About 18 to 36 inches
Runoff class: Low
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 9 inches; silty clay loam
A1—9 to 16 inches; silty clay loam
A2—16 to 23 inches; silty clay loam
Bw1—23 to 35 inches; silty clay
Bw2—35 to 44 inches; silty clay
Bw3—44 to 60 inches; silty clay
Bw4—60 to 70 inches; silty clay
Bg—70 to 80 inches; silty clay

Similar soils: Soils that contain more clay in the particle-size control section; soils that are calcareous at the surface

Minor components

Nodaway
Phase: Occasionally flooded
Extent: About 7 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Kezan
Phase: Occasionally flooded
Extent: About 3 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

General Considerations

• In most areas of this unit, the drainage has been altered in order to reduce the hazard of wetness.
• Most of the acreage of this unit is used for cultivated crops. Corn, soybeans, and grain sorghum are the main crops.

5540—Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Nodaway: 90 percent
Minor components: 10 percent

Component Descriptions

Nodaway

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 13.0 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Occasional
Depth to seasonal zone of saturation: About 36 to 60 inches
Runoff class: Negligible
Ecological site: Silty Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silt loam
C1—7 to 14 inches; stratified silt loam
C2—14 to 45 inches; stratified silt loam
C3—45 to 60 inches; stratified silt loam

Similar soils: Soils that have a thick, dark surface layer; soils that have a stratified, coarse textured surface layer

Minor components

Judson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Nodaway
Phase: Channeled
Extent: About 3 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Kezan
Phase: Occasionally flooded
Extent: About 2 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

General Considerations

- The Nodaway soil is stratified with recent sediments resulting from flooding.
- Most of the acreage of this unit is used for cultivated crops. Corn, soybeans, and grain sorghum are the principal crops.

5541—Nodaway silt loam, 0 to 2 percent slopes, channeled, frequently flooded

Map Unit Composition

Nodaway: 85 percent
Minor components: 15 percent

Component Descriptions

Nodaway

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Drainageways on flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 13.0 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Frequent
Depth to seasonal zone of saturation: About 36 to 60 inches
Runoff class: Negligible
Ecological site: Silty Overflow; Veg. Zone 4
Land capability (nonirrigated): 6w

Typical profile:
A—0 to 7 inches; silt loam
C1—7 to 14 inches; stratified silt loam
C2—14 to 45 inches; stratified silt loam
C3—45 to 60 inches; stratified silt loam

Similar soils: Soils that have a stratified, coarse textured surface layer

Minor components

Nodaway
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Judson
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Kezan
Phase: Occasionally flooded
Extent: About 2 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Wet Subirrigated; Veg. Zone 4

General Considerations

- Most areas of this unit are dissected by a meandering stream channel. There are short, very steep or vertical slopes into the stream channel.
- Most of the acreage of this unit supports native grasses and trees. The area is best suited to wildlife habitat.

5970—Otoe silty clay loam, 5 to 9 percent slopes

Map Unit Composition

Otoe: 85 percent
Minor components: 15 percent

Component Descriptions

Otoe

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands

Hillslope position: Backslopes
Parent material: Loess over till
Slope: 5 to 9 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.4 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Very high
Ecological site: Clayey; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silty clay loam
Bt1—6 to 15 inches; silty clay
Bt2—15 to 22 inches; silty clay
Bt3—22 to 32 inches; silty clay
BC—32 to 40 inches; silty clay loam
C1—40 to 50 inches; silty clay loam
C2—50 to 57 inches; silty clay loam
2C3—57 to 80 inches; silty clay loam

Similar soils: Soils that have redder hues in the subsoil; soils that were previously mapped as Wymore, severely eroded

Minor components

Malmo
Phase: Severely eroded
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Wymore
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 9 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• The Otoe soil formed in areas of clayey Peorian loess deposited over glacial drift.
• Most of the acreage of this unit is used for cultivated crops. The rest has been reseeded to grasses and is used for pasture and hayland. The hazard of water erosion is severe. It can be controlled by contour farming, terraces, and conservation tillage. In most years, wetness is a problem in the spring.

6005—Padonia silty clay loam, 6 to 12 percent slopes

Map Unit Composition

Padonia: 85 percent
Minor components: 15 percent

Component Descriptions

Padonia

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Loess over clayey residuum derived from calcareous shale
Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest permeability: Slow (about 0.06 inch per hour)
Available water capacity: Low (about 5.3 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: High
Ecological site: Clayey; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
A—0 to 11 inches; silty clay loam
Bt—11 to 22 inches; silty clay
Btk—22 to 32 inches; silty clay
BCk—32 to 37 inches; silty clay loam
Cr—37 to 41 inches; weathered bedrock

Minor components

Malmo
Phase: Severely eroded
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 6 to 12 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Kipson
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 5 to 12 percent
Depth to restrictive feature: 7 to 20 inches to bedrock (paralithic)
Drainage class: Somewhat excessively drained
Ecological site: Shallow Limy; Veg. Zone 4

General Considerations

• This map unit occurs in the lower positions on the backslopes.
• Most of the acreage of this unit is used for pasture or rangeland.

7069—Steinauer clay loam, 12 to 30 percent slopes

Map Unit Composition

Steinauer: 85 percent
Minor components: 15 percent

Component Descriptions

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous loamy till
Slope: 12 to 30 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Very high
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; clay loam
AC—6 to 15 inches; clay loam
C1—15 to 41 inches; clay loam
C2—41 to 60 inches; clay loam

Similar soils: Soils that have a surface layer more than 10 inches thick

Minor components

Burchard
Extent: About 12 percent of the unit
Landform: Hillslopes on uplands
Slope: 12 to 30 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Nodaway
Phase: Channeled
Extent: About 3 percent of the unit
Landform: Drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

General Considerations

• Areas of this map unit are typically long and narrow.
• All of the acreage of this unit is used for rangeland or pasture. Cedar trees and other shrubs are a problem unless proper management is applied.

7078—Steinauer clay loam, 30 to 60 percent slopes

Map Unit Composition

Steinauer: 85 percent
Minor components: 15 percent

Component Descriptions

Steinauer

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Backslopes
Parent material: Calcareous loamy till
Slope: 30 to 60 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Runoff class: Very high
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 7e

Typical profile:
Ap—0 to 6 inches; clay loam
AC—6 to 15 inches; clay loam
C1—15 to 41 inches; clay loam
C2—41 to 60 inches; clay loam

Similar soils: Soils that have a surface layer more than 10 inches thick

Minor components

Morrill
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 18 to 30 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Nodaway
Phase: Channeled
Landform: Drainageways on uplands
Extent: About 3 percent of the unit
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Overflow; Veg. Zone 4

Rock outcrop
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 30 to 60 percent
Drainage class: Excessively drained
Ecological site: No Site; Veg. Zone 4

General Considerations

• This map unit is typically long and narrow. Boulders and stones are on the surface in some areas.
• All of the acreage of this unit is used for range or pasture. Trees and brush are common in many areas. These areas provide good habitat for wildlife.

8061—Wymore silty clay loam, 0 to 2 percent slopes

Map Unit Composition

Wymore: 90 percent
Minor components: 10 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Broad interstream divides on uplands
Hillslope position: Summits
Parent material: Loess
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.9 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Low
Ecological site: Clayey; Veg. Zone 4
Land capability (irrigated): 2s
Land capability (nonirrigated): 2s

Typical profile:
Ap—0 to 5 inches; silty clay loam
BA—5 to 9 inches; silty clay
Bt1—9 to 17 inches; silty clay
Bt2—17 to 25 inches; silty clay
Bt3—25 to 32 inches; silty clay
BC—32 to 40 inches; silty clay loam
C—40 to 53 inches; silty clay loam
Ab—53 to 80 inches; silty clay loam

Similar soils: Soils that have a surface layer more than 24 inches thick; soils that have a surface layer of silt loam

Minor components

Butler
Extent: About 10 percent of the unit
Landform: Swales on broad interstream divides on uplands
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• This map unit occurs in level and nearly level areas in high positions on the landform.
• Most of the acreage of this unit is used for cultivated crops, and some areas are irrigated. Major crops are corn, soybeans, and grain sorghum. Wetness is a problem during years in which precipitation is above normal.

8063—Wymore silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Wymore: 90 percent
Minor components: 10 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Hillslopes on uplands
Hillslope position: Shoulders and summits
Parent material: Loess
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.9 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Medium
Ecological site: Clayey; Veg. Zone 4

Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 5 inches; silty clay loam
BA—5 to 9 inches; silty clay
Bt1—9 to 17 inches; silty clay
Bt2—17 to 25 inches; silty clay
Bt3—25 to 32 inches; silty clay
BC—32 to 40 inches; silty clay loam
C—40 to 53 inches; silty clay loam
Ab—53 to 80 inches; silty clay loam

Similar soils: Soils that have a dark surface layer more than 24 inches thick

Minor components

Otoe
Phase: Severely eroded
Extent: About 6 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 5 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

Malmo
Phase: Severely eroded
Extent: About 4 percent of the unit
Landform: Hillslopes on uplands
Slope: 2 to 6 percent
Drainage class: Moderately well drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• This map unit occurs in the high positions on the landform.
• Most of the acreage of this unit is used for cultivated crops. Major crops are corn, soybeans, and grain sorghum. Wetness is a problem during years in which precipitation is above normal. The hazard of water erosion can be controlled by contour farming, terraces, and conservation tillage.

8080—Wymore silty clay loam, terrace, 0 to 2 percent slopes

Map Unit Composition

Wymore: 90 percent
Minor components: 10 percent

Component Descriptions

Wymore

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Landform: Stream terraces in river valleys
Parent material: Loess
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.9 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: About 12 to 36 inches
Runoff class: Low
Ecological site: Clayey; Veg. Zone 4
Land capability (irrigated): 2s
Land capability (nonirrigated): 2s

Typical profile:
Ap—0 to 5 inches; silty clay loam
BA—5 to 9 inches; silty clay
Bt1—9 to 17 inches; silty clay
Bt2—17 to 25 inches; silty clay
Bt3—25 to 32 inches; silty clay
BC—32 to 40 inches; silty clay loam
C—40 to 80 inches; silty clay loam

Similar soils: Soils that have a surface layer of silt loam

Minor components

Butler
Extent: About 10 percent of the unit
Landform: Swales on broad interstream divides on uplands
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey; Veg. Zone 4

General Considerations

• Many areas of this map unit have been leveled for furrow irrigation. Coarse textured materials are at a depth of 12 to 18 feet.
• Most of the acreage of this unit is used for cultivated crops, and more than half of the acreage is irrigated by furrow or sprinkler irrigation systems. Corn and soybeans are the principal crops.

9900—Arents, earthen dam

Map Unit Composition

Arents, earthen dam: 100 percent

Component Descriptions

Arents, earthen dam

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Depth to seasonal zone of saturation: More than 6 feet
Land capability (nonirrigated): 8

General Considerations

• This map unit consists of barriers constructed to control the flow or raise the level of water. The dams are typically constructed with earthen material. They may be covered with earthy material or armored with concrete or rock.

9980—Pits, quarry

Map Unit Composition

Pits, quarry: 100 percent

Component Descriptions

Pits, quarry

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Available water capacity: Very low (about 0.0 inches)
Depth to seasonal zone of saturation: More than 6 feet

Typical profile:
0 to 60 inches; bouldery fragmental material

General Considerations

• This map unit consists of open excavations from which soil and, commonly, underlying material have been removed. Rock or other material is exposed in the excavations.

9985—Pits, sand and gravel

Component Descriptions

Pits

MLRA: 106—Nebraska and Kansas Loess-Drift Hills
Slope: 0 to 30 percent
Drainage class: Excessively drained
Slowest permeability: Rapid (about 6.00 inches per hour)
Available water capacity: Low (about 3.5 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Land capability (nonirrigated): 8s

General Considerations

• This map unit consists of open excavations from which soil and, commonly, underlying material have been removed. Rock or other material is exposed in the excavations.

9995—Waste water, sewage lagoon

Component Description

This map unit consists of bodies of water identified for use as sewage lagoons, industrial waste ponds, or other miscellaneous water areas.

9998—Water

Component Description

This map unit includes streams, lakes, ponds, and estuaries. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered with water throughout the year.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately well suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, and estimated yields of the main crops and pasture plants are listed.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Land Capability Classification

Land capability classification (USDA, 1961) shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their

limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat. Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

The general crop production index is shown in table 7. The index is a relative rating of the capacity of a soil to produce a specific plant under a defined management system. It is determined from soil properties and is used to rank the map units based on potential yield capability. It can be used to estimate the net returns from crops, to estimate land assessment values, and to perfom risk analysis when land management decisions are made.

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 8 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in table 8 follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of a site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available on the Internet in chapter 4 of the "National Range and Pasture Handbook."

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting

stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in tables 10a and 10b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 10a and 10b can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence

trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, grain sorghum, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, reed canarygrass, smooth bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod,

sunflowers, switchgrass, smartweed, giant ragweed, and foxtail.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, cottonwood, chokecherry, wild plum, gooseberry, black walnut, and mulberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and skunkbush sumac.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cedar, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are American plum, chokecherry, buckbrush, and sumac.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, reed canarygrass, cordgrass, rushes, sedges, and cattails.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, mourning dove, killdeer, and coyote.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, song birds, woodpeckers, squirrels, opossum, raccoon, whitetail deer, and skunks.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include whitetail deer, coyote, and meadowlark.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential,

available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 12a and 12b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the

traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 13a and 13b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground

water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Tables 14a and 14b give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They

are used in many kinds of construction. Specifications for each use vary widely. In table 14a, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of gravel or sand are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains gravel or sand, the soil is rated as a probable source regardless of thickness. The assumption is that the gravel or sand layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of gravel and sand. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the soil is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, or topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or

installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

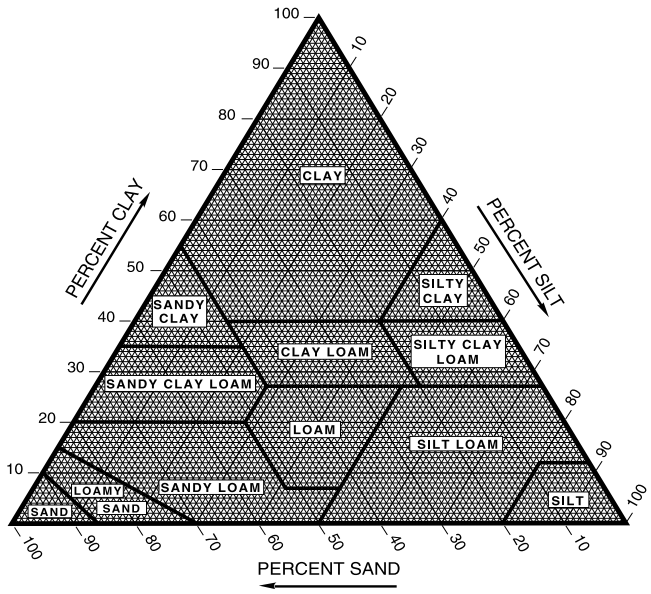

Figure 1.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 16 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 1). “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 17 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 17, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low

if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into

calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Soil Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the kind and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth* refers to the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Soil saturation refers to a saturated zone in the soil. Table 20 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 20 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Mollic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, mesic Mollic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. 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 Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1998). Following the pedon description is the range of important characteristics of the soils in the series.

Burchard Series

The Burchard series consists of very deep, well drained soils that formed in calcareous glacial till. These soils are on uplands. Permeability is moderately slow. Slopes range from 2 to 30 percent. The mean annual precipitation is about 30 inches, and the mean annual temperature is about 54 degrees F at the type location.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Burchard clay loam, on a slope of 8 percent, in an area of native rangeland about 1 mile north and 2 miles east of Burchard, in Pawnee County, Nebraska; 400 feet west and 400 feet north of the southeast corner of sec. 5, T. 2 N., R. 10 E.; Burchard USGS topographic quadrangle; lat. 40 degrees 9 minutes 43 seconds N. and long. 96 degrees 18 minutes 50 seconds W. (Colors are for moist soil unless otherwise indicated.)

A—0 to 13 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; moderate medium and fine granular structure; slightly hard, friable; many very fine and fine and few medium and coarse roots throughout; slightly acid; gradual wavy boundary.

Bt—13 to 19 inches; 60 percent dark brown (10YR 4/3) and 40 percent mixing of dark grayish brown (10YR 4/2) clay loam, brown (10YR 5/3) and grayish brown (10YR 5/2) dry; moderate fine and very fine subangular blocky structure; hard, friable; thin discontinuous clay films on faces of peds; neutral; clear wavy boundary.

Btk—19 to 29 inches; olive brown (2.5Y 4/4) clay loam, light yellowish brown (2.5Y 6/4) dry; moderate fine subangular blocky structure; hard, friable; common fine and medium roots throughout; thin discontinuous clay films on faces of peds; soft accumulations of segregated lime; slight effervescence; moderately alkaline; gradual wavy boundary.

Bk—29 to 37 inches; light brownish gray (2.5Y 6/2) and dark yellowish brown (10YR 4/4) clay loam, light gray (2.5Y 7/2) and yellowish brown (10YR 5/4) dry; moderate medium angular blocky structure; hard, friable; few very fine, fine, and medium roots in cracks; many medium and coarse soft accumulations of segregated lime; slight effervescence; moderately alkaline; gradual wavy boundary.

C—37 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, light gray (2.5Y 7/2) dry; weak coarse and medium angular blocky structure; hard, firm; many fine seams and pockets of soft lime; 5 percent, by volume, gravel; strong effervescence; many coarse distinct yellowish brown (10YR 5/4) soft masses of iron accumulation; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 51 to 56 degrees F
Depth to argillic horizon: 8 to 18 inches
Depth to secondary calcium carbonate: 12 to 30 inches
Depth to redoximorphic concentrations: 22 to 80 inches, if present
Thickness of the solum: 24 to 80 inches
Content of clay in the particle-size control section (weighted average): 27 to 35 percent
Content of sand in the particle-size control section (weighted average): 20 to 45 percent fine and coarser sand
Content of rock fragments in the particle-size control section (weighted average): 1 to 10 percent, by volume, gravel

A horizon:
- Hue—10 YR
- Value—3 to 5 dry, 2 or 3 moist
- Chroma—1 or 2
- Texture—loam, silt loam, or clay loam
- Content of clay—18 to 30 percent
- Reaction—moderately acid to neutral

Bt horizon:
- Hue—10YR
- Value—4 to 7 dry, 3 to 6 moist
- Chroma—2 to 6
- Texture—clay loam
- Content of clay—27 to 35 percent; as much as 38 percent in some pedons
- Reaction—slightly acid or neutral

Btk horizon:
- Hue—10YR or 2.5Y
- Value— 4 to 7 dry, 3 to 6 moist
- Chroma—2 to 6
- Texture—loam or clay loam
- Content of clay—18 to 30 percent
- Calcium carbonate equivalent—5 to 10 percent
- Reaction—slightly alkaline or moderately alkaline

Bk horizon (if it occurs):
- Hue—10YR or 2.5Y
- Value—4 to 7 dry, 3 to 6 moist
- Chroma—2 to 6
- Texture—loam or clay loam
- Content of clay—18 to 30 percent
- Calcium carbonate equivalent—5 to 10 percent
- Reaction—slightly alkaline or moderately alkaline

C horizon:
- Hue—10 YR or 2.5Y
- Value—6 or 7 moist or dry
- Chroma—2 or 3
- Texture—loam or clay loam
- Content of clay—25 to 35 percent
- Calcium carbonate equivalent—10 to 15 percent
- Content of gypsum—0 to 2 percent
- Reaction—slightly alkaline or moderately alkaline

Butler Series

The Butler series consists of very deep, somewhat poorly drained soils that formed in loess or mixed loess and alluvium. These soils are on flats or in slightly concave swales on uplands and high stream terraces. Permeability is very slow. Slopes range from 0 to 2 percent. The mean annual precipitation is about 27 inches, and the mean annual temperature is about 55 degrees F at the type location.

Taxonomic classification: Fine, smectitic, mesic Vertic Argiaquolls

Typical Pedon

Butler silt loam, on a slope of less than 1 percent, in a cultivated field about 3 miles south of Princeton, in Lancaster County, Nebraska; 2,500 feet west and 1,260 feet south of the northeast corner of sec. 35, T. 7 N., R. 6 E.; Cortland USGS topographic quadrangle; lat. 40 degrees 32 minutes 3 seconds N. and long. 96 degrees 42 minutes 47 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; moderately acid; abrupt smooth boundary.

A—6 to 10 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure parting to weak fine granular; friable; moderately acid; abrupt smooth boundary.

E—10 to 12 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium platy structure parting to weak fine granular; very friable; moderately acid; abrupt smooth boundary.

Bt1—12 to 25 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; strong medium prismatic structure parting to strong medium angular blocky; very firm; slightly acid; gradual smooth boundary.

Bt2—25 to 34 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark grayish brown (2.5Y 4/2) dry; strong medium prismatic structure parting to strong medium angular blocky; very firm; neutral; gradual smooth boundary.

BCk—34 to 43 inches; olive gray (5Y 4/2) silty clay loam, light olive gray (5Y 6/2) dry; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; slightly alkaline; few fine iron-manganese concretions and many fine carbonate concretions; strongly effervescent throughout; gradual smooth boundary.

C—43 to 60 inches; olive (5Y 5/3) silty clay loam, pale yellow (5Y 7/3) dry; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; friable; slightly alkaline; few fine rounded very dark grayish brown (10YR 3/2) masses of iron-manganese accumulation and many fine carbonate concretions; strongly effervescent throughout.

Range in Characteristics

Soil moisture regime: Aquic; the soil moisture control section is wet from March to July.
Mean annual soil temperature: 48 to 55 degrees F
Depth to abrupt textural change: 6 to 17 inches
Depth to albic horizon: 6 to 14 inches
Depth to argillic horizon: 6 to 17 inches
Depth to secondary calcium carbonate: 24 to 80 inches
Depth to redoximorphic concentrations: 6 to 17 inches
Depth to episaturation: 6 to 24 inches from March to July
Thickness of the solum: 24 to 80 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 12 to 38 inches
Content of clay in the particle-size control section (weighted average): 45 to 55 percent
Content of sand in the particle-size control section (weighted average): 1 to 12 percent

Ap horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—18 to 35 percent
Reaction—strongly acid to slightly acid

E horizon:
Hue—10YR
Value—4 or 5 dry, 3 moist
Chroma—1
Texture—silt loam
Content of clay—18 to 27 percent
Reaction—strongly acid to slightly acid

Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—45 to 55 percent
Reaction—moderately acid to slightly alkaline; if present, redoximorphic concentrations are few to many and range from brown (7.5YR 4/4) to yellowish brown (10YR 5/6)

BC horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6 dry, 3 or 4 moist
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—32 to 45 percent
Reaction—neutral to moderately alkaline; redoximorphic concentrations are few to many and range from brown (7.5YR 4/4) to yellowish brown (10YR 5/6)

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 7 dry, 3 to 5 moist
Chroma—1 to 3
Texture—silt loam or silty clay loam
Content of clay—20 to 35 percent
Reaction—neutral to moderately alkaline

Chase Series

The Chase series consists of very deep soils that formed in alluvium. These soils are on flood plains. Permeability is very slow. Slopes range from 0 to 2 percent. The mean annual precipitation is 34 inches, and the mean annual temperature is 56 degrees F.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Chase silty clay loam, in a cultivated field about 1 mile northeast of Reading, in Lyon County, Kansas; 330 feet west and 2,000 feet north of the southeast corner of sec. 34, T. 17 S., R. 13 E. (Colors are for moist soil unless otherwise indicated.

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; slightly hard, friable, slightly plastic, slightly sticky; few wormcasts; moderately acid; clear smooth boundary.
A—6 to 14 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; slightly hard, friable, slightly plastic, slightly sticky; few fine irregularly shaped iron-manganese concretions; moderately acid; gradual smooth boundary.
BA—14 to 20 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; hard, firm, plastic, sticky; few fine distinct dark brown (10YR 3/3) masses of iron accumulation; few fine rounded iron-manganese concretions; few fine wormholes; few wormcasts; slightly acid; gradual smooth boundary.
Bt1—20 to 34 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium and fine subangular blocky structure; very hard, very firm, very plastic, very sticky; common medium distinct dark yellowish brown (10YR 4/4) irregularly shaped masses of iron accumulations; few fine rounded iron-manganese concretions; few fine clay films on faces of peds; few fine wormholes; few wormcasts; slightly acid; gradual smooth boundary.
Bt2—34 to 42 inches; very dark brown (10YR 2/2) silty clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; very hard, very firm, very plastic, very sticky; common fine distinct yellowish brown (10YR 5/4) irregularly shaped masses of iron accumulation; few fine rounded iron-manganese concretions; common fine clay films on faces of peds; neutral; diffuse smooth boundary.
BC—42 to 54 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; very weak subangular blocky structure; hard, firm, plastic, sticky; few fine distinct yellowish brown (10YR 5/4) irregularly shaped masses of iron accumulations; few fine rounded iron-manganese concretions; neutral; diffuse smooth boundary.
C—54 to 80 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark gray (10YR 4/1) dry; massive; hard, firm, plastic, sticky; few fine distinct yellowish brown (10YR 5/4) irregularly shaped iron accumulations; few fine rounded black iron-manganese concretions; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 12 to 30 inches
Depth to redoximorphic concentrations: 6 to 20 inches
Depth to episaturation: 24 to 48 inches from January to April
Thickness of the mollic epipedon: Greater than 36 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 20 to 42 inches
Content of clay in the particle-size control section (weighted average): 35 to 55 percent
Content of sand in the particle-size control section (weighted average): 1 to 4 percent

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2

Texture—silt loam or silty clay loam
Content of clay—12 to 40 percent
Reaction—moderately acid to neutral

BA horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 6 dry
Chroma—1 or 2
Texture—silty clay loam, silty clay, or clay
Content of clay—35 to 55 percent
Reaction—moderately acid to slightly alkaline

C horizon:
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 6 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—27 to 55 percent
Reaction—slightly acid to moderately alkaline; fine carbonate concretions in some pedons

Cortland Series

The Cortland series consists of very deep, well drained soils that formed in loamy glacial till or outwash deposits. These soils are on uplands. Slopes range from 2 to 18 percent. The mean annual precipitation is about 32 inches, and the mean annual temperature is about 51 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs

Typical Pedon

Cortland loam, in an area of cropland about 3 miles east and 1 mile north of Hoag, in Gage County, Nebraska; 1,650 feet west and 450 feet south of the northeast corner of sec. 7, T. 4 N., R. 6 E.; Beatrice West USGS topographic quadrangle; lat. 40 degrees 20 minutes 3 seconds N. and long. 96 degrees 47 minutes 27 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; dark brown (7.5YR 3/2) loam, brown (7.5YR 4/3) dry; weak fine granular structure; very friable; common fine roots throughout; common fine tubular pores; 1 percent, by volume, pebbles; very strongly acid; abrupt smooth boundary.

Bt1—6 to 15 inches; brown (7.5YR 4/3) clay loam, brown (7.5YR 4/4) dry; moderate medium subangular blocky structure; friable; common very fine and fine roots throughout; common fine tubular pores; faint patchy clay films on faces of peds; distinct discontinuous pressure faces on vertical and horizontal faces of peds and dark brown (7.5YR 3/2) organic coats in root channels and pores; 2 percent, by volume, pebbles; strongly acid; clear smooth boundary.

Bt2—15 to 28 inches; reddish brown (5YR 4/4) clay loam, reddish brown (5YR 5/4) dry; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine and fine roots throughout; common fine tubular pores; prominent discontinuous clay films on vertical and horizontal faces of peds; prominent continuous pressure faces on vertical and horizontal faces of peds and dark brown (7.5YR 3/2) organic coats in root channels and pores; 2 percent, by volume, pebbles; moderately acid; clear smooth boundary.

BC—28 to 36 inches; brown (7.5YR 4/3) sandy loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; very friable; common very fine and fine roots throughout; common very fine tubular pores; 3 percent, by volume, pebbles; moderately acid; clear smooth boundary.

2C1—36 to 40 inches; brown (10YR 4/3) loamy sand, yellowish brown (10YR 5/4) dry; massive; loose; few very fine and fine roots throughout; common very fine tubular pores; 3 percent, by volume, pebbles; slightly acid; gradual smooth boundary.

2C2—40 to 50 inches; dark yellowish brown (10YR 4/4) loamy sand, light yellowish brown (10YR 6/4) dry; massive; loose; few very fine and fine roots throughout; common very fine tubular pores; 6 percent, by volume, pebbles; slightly acid; gradual smooth boundary.

2C3—50 to 80 inches; brown (10YR 5/3) loamy sand, very pale brown (10YR 7/3) dry; massive; loose; common very fine tubular pores; 2 percent, by volume, pebbles; slightly acid.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 50 to 54 degrees F
Depth to argillic horizon: 3 to 9 inches
Thickness of the solum: 30 to 48 inches
Content of clay in the particle-size control section (weighted average): 18 to 35 percent

Content of sand in the particle-size control section (weighted average): Greater than 20 percent

A horizon:
- Hue—10YR or 7.5YR
- Value—2 or 3 moist, 3 to 5 dry
- Chroma—1 to 3
- Texture—loam or clay loam
- Content of clay—15 to 35 percent
- Content of rock fragments—0 to 14 percent, by volume, pebbles
- Reaction—very strongly acid to moderately acid

Bt horizon:
- Hue—7.5YR or 5YR
- Value—3 to 5 moist, 4 to 6 dry
- Chroma—3 to 6
- Texture—loam, clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam
- Content of clay—18 to 35 percent
- Content of rock fragments—1 to 20 percent, by volume, pebbles
- Reaction—strongly acid to slightly acid

BC or C horizon:
- Hue—10YR, 7.5YR, or 5YR
- Value—4 to 6 moist, 4 to 7 dry
- Chroma—3 to 6
- Texture—loam, clay loam, sandy clay loam, sandy loam, fine sandy loam, loamy fine sand, sand, gravelly loam, gravelly clay loam, gravelly sandy clay loam, or gravelly sandy loam; strata of clay in a few pedons
- Content of clay—5 to 30 percent
- Content of rock fragments—1 to 20 percent, by volume, pebbles
- Reaction—moderately acid to neutral

Deroin Series

The Deroin series consists of very deep, well drained soils that formed in reddish silty material presumed to be Loveland loess. These soils are on uplands. Slopes range from 2 to 17 percent. The mean annual precipitation is about 34 inches, and the mean annual air temperature is about 53 degrees F at the type location.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Mollic Hapludalfs

Typical Pedon

Deroin silty clay loam, on an east-facing convex side slope of 7 percent, in an area of cropland about 8 miles north and 5 miles west of Falls City, in Richardson County, Nebraska; 100 feet south and 1,050 feet east of the northwest corner of sec. 35, T. 3 N., R. 15 E.; Verdon USGS topographic quadrangle; lat. 40 degrees 11 minutes 20 seconds N. and long. 95 degrees 42 minutes 19 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; dark brown (7.5YR 3/2) silty clay loam, brown (10YR 5/3) dry; weak fine and medium granular structure; slightly hard, friable; few fine roots throughout; few fine tubular pores; moderately acid; abrupt smooth boundary.

Bt1—7 to 12 inches; reddish brown (5YR 4/3) silty clay loam, brown (7.5YR 5/4) dry; weak fine and medium prismatic structure parting to weak fine subangular blocky; slightly hard, friable; few fine roots throughout; few fine tubular pores; faint discontinuous clay films on faces of peds; few fine irregular iron-manganese concretions; slightly acid; gradual smooth boundary.

Bt2—12 to 18 inches; reddish brown (5YR 4/4) silty clay loam, brown (7.5YR 5/4) dry; weak coarse subangular blocky structure parting to weak fine and medium subangular blocky; slightly hard, friable; few fine roots throughout; few fine tubular pores; distinct discontinuous clay films on faces of peds; few fine irregular iron-manganese concretions; neutral; gradual smooth boundary.

Bt3—18 to 40 inches; reddish brown (5YR 4/4) silty clay loam, brown (7.5YR 5/4) dry; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, friable; few fine tubular pores; distinct discontinuous clay films on faces of peds; few fine irregular iron-manganese concretions; slightly acid; gradual smooth boundary.

BC—40 to 50 inches; reddish brown (5YR 4/4) silty clay loam, reddish brown (5YR 5/4) dry; weak fine and medium subangular blocky structure; slightly hard, friable; few fine irregular iron-manganese concretions; slightly acid; gradual smooth boundary.

C—50 to 80 inches; reddish brown (5YR 4/4) silty clay loam, reddish brown (5YR 5/4) dry; massive; slightly hard, friable; few fine irregular iron-manganese concretions; slightly acid; few fine sand grains throughout.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 53 to 56 degrees F
Depth to argillic horizon: 4 to 9 inches
Depth to secondary calcium carbonate: Commonly more than 60 inches, but some pedons contain carbonates between depths of 30 and 60 inches.

Thickness of mollic colors: between depths of 4 and 9 inches
Content of clay in the particle-size control section (weighted average): 27 to 35 percent
Content of sand in the particle-size control section (weighted average): 5 to 30 percent

A horizon:
Hue—7.5YR or 10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—2 or 3
Texture—silty clay loam or clay loam
Content of clay—27 to 35 percent
Reaction—moderately acid or slightly acid

Bt horizon:
Hue—7.5YR or 5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6
Texture—silty clay loam or clay loam
Content of clay—27 to 35 percent
Content of sand—5 to 30 percent
Reaction—slightly acid to slightly alkaline

BC horizon:
Hue—7.5YR or 5YR
Value—4 or 5 moist, 5 to 7 dry
Chroma—3 to 6
Texture—silty clay loam or clay loam
Content of clay—27 to 35 percent
Content of sand—5 to 25 percent very fine sand
Reaction—slightly acid to slightly alkaline

C horizon:
Hue—7.5YR or 5YR
Value—4 or 5 moist, 5 to 7 dry
Chroma—3 to 6
Texture—silty clay loam, clay loam, loam, or silt loam
Content of clay—24 to 32 percent
Content of sand—5 to 25 percent very fine sand
Reaction—slightly acid to slightly alkaline

Edalgo Series

The Edalgo series consists of moderately deep, well drained soils that formed in residuum derived from sandy and/or clayey shales. These soils are on uplands. Slopes range from 1 to 40 percent. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 55 degrees F.

Taxonomic classification: Fine, mixed, superactive, mesic Udic Argiustolls

Typical Pedon

Edalgo sandy clay loam, on a northeast-facing slope of 10 percent, in an area of native grass about 1 mile south and 6 miles west of Minneapolis, in Ottawa County, Kansas; 1,300 feet south and 1,200 feet west of the northeast corner of sec. 13, T. 11 S., R. 5 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 8 inches; dark grayish brown (10YR 4/2) sandy clay loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, slightly plastic and slightly sticky; common fine and very fine roots; about 3 percent sandstone fragments 1/2 inch to 2 inches in diameter; moderately acid; clear smooth boundary.
BA—8 to 12 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and very fine roots; about 3 percent sandstone fragments 1/2 inch to 2 inches in diameter; slightly acid; gradual smooth boundary.
2Bt—12 to 21 inches; brown (10YR 5/3) and reddish brown (5YR 4/4) clay, brown (10YR 4/3) and reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; very hard, very firm, very plastic and very sticky; few fine faint clay films on horizontal faces of peds; common very fine roots; moderately acid; clear wavy boundary.
2C1—21 to 32 inches; mixed red (2.5YR 4/6) and light gray (10YR 7/1) clay, dark red (2.5YR 3/6) and gray (10YR 5/1) moist; massive; very hard, very firm, very plastic and very sticky; few very fine roots; few fine lime concretions; moderately alkaline; clear smooth boundary.
2C2—32 to 38 inches; mixed brownish yellow (10YR 6/8), light gray (10YR 7/1), and red (2.5YR 4/6) silty clay, yellowish brown (10YR 5/8), gray (10YR 5/1), and red (2.5YR 4/6) moist; massive; hard, firm, very plastic and very sticky; few very fine roots; few fine lime concretions; moderately alkaline; clear smooth boundary.
2Cr—38 to 45 inches; light gray (10YR 7/1) and red (2.5YR 4/6) shale; few fine lime concretions.

Range in Characteristics

Soil moisture regime: Ustic bordering on Udic
Depth to paralithic contact: 20 to 40 inches to shale
Depth to argillic horizon: 8 to 24 inches

Thickness of the mollic epipedon: 8 to 18 inches; some pedons do not have a lithologic discontinuity.
Content of clay in the particle-size control section (weighted average): 27 to 65 percent
Content of sand in the particle-size control section (weighted average): 4 to 45 percent
Content of pararock fragments in the particle-size control section (weighted average): 0 to 10 percent, by volume
Size of pararock fragments in the particle-size control section: 2 mm to 3 inches
Kind of pararock fragments in the particle-size control section: Sandstone and ironstone
Other features: Concretions and soft accumulations of lime do not occur in all pedons. Some pedons do not have a C horizon.

A horizon:
Hue—7.5YR or 10YR
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2 dry or moist
Texture—sandy clay loam, loam, silt loam, or silty clay loam
Content of clay—15 to 37 percent
Reaction—moderately acid to neutral

2Bt horizon:
Hue—7.5YR to 2.5Y
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4 dry or moist
Texture—silty clay, clay, silty clay loam, or clay loam
Content of clay—27 to 65 percent
Reaction—moderately acid to neutral

2C horizon:
Hue—2.5YR to 2.5Y
Value—4 to 7 dry, 3 to 6 moist
Chroma—1 to 8 dry or moist
Texture—silty clay, clay, silty clay loam, or clay loam
Content of clay—27 to 65 percent
Reaction—neutral to moderately alkaline

Filley Series

The Filley series consists of very deep, well drained soils on uplands. these soils formed in glacial outwash deposits that have been reworked by wind. Slopes range from 6 to 20 percent. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 51 degrees F at the type location.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Hapludolls

Typical Pedon

Filley fine sandy loam, on a convex slope of 8 percent, in a cultivated area about 0.5 mile west and 1 mile south of Denton, in Lancaster County, Nebraska; 1,700 feet south and 500 feet west of the northeast corner of sec. 28, T. 9 N., R. 5 E.; Denton USGS topographic quadrangle; lat. 40 degrees 43 minutes 50 seconds N. and long. 96 degrees 51 minutes 20 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; common very fine and fine roots throughout; common fine tubular pores; slightly hard, very friable; moderately acid; abrupt smooth boundary.
A—6 to 12 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 3/3) dry; weak fine and medium subangular blocky structure; common very fine and fine roots throughout; common fine tubular pores; slightly hard, very friable; moderately acid; clear wavy boundary.
Bw—12 to 23 inches; dark yellowish brown (10YR 4/4) fine sandy loam, dark yellowish brown (10YR 5/4) dry; weak fine and medium subangular blocky structure; common very fine and fine roots throughout; common fine tubular pores; soft, very friable; moderately acid; clear wavy boundary.
BC—23 to 30 inches; yellowish brown (10YR 5/6) fine sandy loam, brownish yellow (10YR 6/6) dry; very weak medium subangular blocky structure; few very fine and fine roots throughout; common fine tubular pores; soft, very friable; moderately acid; gradual wavy boundary.
C1—30 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand, very pale brown (10YR 7/4) dry; single grain; few fine roots throughout; loose; moderately acid; gradual wavy boundary.
C2—60 to 80 inches; yellowish brown (10YR 5/4) fine sand, very pale brown (10YR 7/4) dry; single grain; loose; 1 percent, by volume, gravel; moderately acid.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 52 to 55 degrees F
Depth to cambic horizon: 10 to 24 inches
Thickness of the mollic epipedon: 10 to 24 inches
Content of clay in the particle-size control section (weighted average): 5 to 18 percent
Content of sand in the particle-size control section (weighted average): 52 to 85 percent

Ap or A horizon:
Hue—10YR

Value—2 or 3 moist or dry
Chroma—1 to 3
Texture—fine sandy loam or loam
Content of clay—5 to 18 percent
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5 moist or dry
Chroma—2 to 4
Texture—sandy loam or fine sandy loam
Content of clay—5 to 18 percent
Reaction—slightly acid to strongly acid

BC and C horizons:
Hue—10YR
Value—4 to 7 moist or dry
Chroma—3 to 6
Texture—loamy fine sand, loamy sand, or fine sand
Content of clay—4 to 10 percent
Content of rock fragments—0 to 5 percent, by volume, gravel in the lower part of the C horizon
Reaction—slightly acid or moderately acid

Hedville Series

The Hedville series consists of shallow and very shallow, somewhat excessively drained soils on uplands. These soils formed in residuum derived from noncalcareous sandstone. Permeability is moderate. Slopes range from 3 to 30 percent. The mean annual precipitation is 26 inches, and the mean annual temperature is 54 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplustolls

Typical Pedon

Hedville cobbly loam, in an area of native grass, 5 miles west and 1/2 mile north of Miltonvale, in Cloud County, Kansas; 1,940 feet north and 300 feet east of the southwest corner of sec. 16, T. 8 S., R. 2 W. (Colors are for dry soil unless otherwise indicated.)

A1—0 to 12 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure (very fine granular in the upper 1 inch); slightly hard, very friable; many fine roots; many insect burrows and pores; 20 percent pebbles and angular cobbles of sandstone; slightly acid; gradual wavy boundary.
A2—12 to 16 inches; brown (7.5YR 4/2) cobbly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, very friable; many fine roots; many insect burrows; pebbles and angular cobblestones of weathered sandstone comprise 20 percent of the soil mass; moderately acid; clear irregular boundary extending into cracks and pockets weathered into sandstone bedrock.
R—16 inches; brown sandstone.

Range in Characteristics

Soil moisture regime: Ustic
Depth to lithic contact: 4 to 19 inches to bedrock
Content of clay in the particle-size control section (weighted average): 8 to 22 percent
Content of sand in the particle-size control section (weighted average): 30 to 80 percent
Content of rock fragments in the particle-size control section (weighted average): 5 to 35 percent, by volume
Size of rock fragments in the particle-size control section: Cobbles or stones
Kind of rock fragments in the particle-size control section: Sandstone

A horizon:
Hue—10YR or 7.5YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3 dry or moist
Texture—loam, sandy loam, or fine sandy loam
Content of clay—8 to 22 percent
Content of rock fragments—5 to 35 percent stones or cobbles
Reaction—moderately acid to neutral

Bw or C horizon (if it occurs):
Hue—10YR, 7.5Y, or 5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 to 4 dry or moist
Texture—loam, sandy loam, or fine sandy loam
Content of clay—8 to 22 percent
Content of rock fragments—5 to 35 percent stones or cobbles
Reaction—moderately acid to neutral

Judson Series

The Judson series consists of very deep, well drained soils that formed in silty colluvium. These soils are on footslopes and alluvial fans. Slopes range from 0 to 11 percent. The mean annual temperature is about 50 degrees F, and the mean annual precipitation is about 32 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Judson silt loam, on a slope of 4 percent, in a cultivated area about 1 mile west and 2 miles north of

Bennet, in Lancaster County, Nebraska; 100 feet south and 1,000 feet east of the northwest corner of sec. 28, T. 9 N., R. 8 E.; Bennet USGS topographic quadrangle; lat. 40 degrees 43 minutes 33 seconds N. and long. 96 degrees 32 minutes 10 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; slightly hard, friable; common fine roots throughout; common fine tubular pores; moderately acid; abrupt smooth boundary.

A1—6 to 14 inches; very dark brown (10YR 2/2) silt loam, very dark gray (10YR 3/1) dry; weak fine granular structure; slightly hard, friable; common fine roots throughout; common fine tubular pores; moderately acid; gradual smooth boundary.

A2—14 to 25 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; slightly hard, friable; common fine roots throughout; common fine tubular pores; moderately acid; gradual smooth boundary.

AB—25 to 29 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; slightly hard, friable; few fine roots throughout; few fine tubular pores; moderately acid; clear smooth boundary.

Bw—29 to 42 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, firm; few fine roots throughout; few fine tubular pores; moderately acid; gradual smooth boundary.

BC—42 to 55 inches; dark brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; weak medium prismatic structure; hard, firm; few fine roots throughout; few fine tubular pores; moderately acid; gradual smooth boundary.

C—55 to 60 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; massive; slightly hard, friable; slightly acid.

Range in Characteristics

Soil moisture regime: Udic
Thickness of the solum: 40 to more than 60 inches
Thickness of the mollic epipedon: 32 to 52 inches
Reaction in the solum: Slightly acid or moderately acid in the most acid part
Content of clay in the particle-size control section (weighted average): 30 to 35 percent
Content of sand in the particle-size control section (weighted average): Less than 10 percent

A horizon:
Hue—10YR
Value—2
Chroma—1 or 2
Texture—silty clay loam or silt loam
Content of clay—24 to 32 percent
Reaction—moderately acid to neutral
Special features—as much as 12 inches of overwash with value of 3 in some pedons

AB horizon:
Hue—10YR
Value—2 or 3
Chroma—2
Texture—silty clay loam
Content of clay—27 to 32 percent
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam
Content of clay—30 to 35 percent
Reaction—moderately acid to neutral
Special features—darker coatings on peds are common; mottles of low or high chroma are as shallow as 30 inches in some pedons

BC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam; but silt loam is within the range
Content of clay—25 to 32 percent
Reaction—slightly acid to slightly alkaline
Special features—few or common mottles with chroma of 1 to 6 in some pedons

C horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or, less commonly, silt loam
Content of clay—25 to 32 percent
Reaction—slightly acid to slightly alkaline
Special features—few or common mottles with chroma of 1 to 6 in some pedons

Kennebec Series

The Kennebec series consists of deep, moderately well drained soils that formed in alluvium. These soils are on flood plains. Slopes range from 0 to 2 percent.

The mean annual air temperature is about 49 degrees F, and the mean annual precipitation is about 30 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Cumulic Hapludolls

Typical Pedon

Kennebec silt loam, on a slope of about 1 percent, in a cultivated area about 1 mile east and 1 mile north of Rokeby, in Lancaster County, Nebraska; 2,380 feet south and 405 feet west of the northeast corner of sec. 26, T. 9 N., R. 6 E.; Rokeby USGS topographic quadrangle; lat. 40 degrees 43 minutes 11.6 seconds N. and long. 96 degrees 42 minutes 8.4 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; moderately acid; clear smooth boundary.
A1—10 to 19 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine and medium granular structure; friable; moderately acid; clear smooth boundary.
A2—19 to 45 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; moderately acid; gradual smooth boundary.
A3—45 to 56 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure parting to moderate fine subangular blocky; firm; moderately acid; gradual smooth boundary.
AC—56 to 70 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate medium and coarse subangular blocky structure; firm; slightly acid; gradual smooth boundary.
C—70 to 80 inches; very dark gray (10YR 3/2) silty clay loam, gray (10YR 5/2) dry; weak medium subangular blocky structure; firm; slightly acid.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is 3 to 5 feet.
Depth to secondary calcium carbonate: Greater than 60 inches
Thickness of the solum: Greater than 36 inches
Thickness of the mollic epipedon: Greater than 36 inches
Reaction in the solum: Dominantly slightly acid or neutral but ranges to moderately acid in the upper part of the A horizon
Content of clay in the particle-size control section (weighted average): 24 to 30 percent; variable below a depth of 40 inches
Content of sand in the particle-size control section (weighted average): Less than 10 percent; variable below a depth of 40 inches

A horizon:
Hue—10YR
Value—2 or 3 (3 or 4 overwash); value increases gradually 1 or 2 units with depth below the A2 horizon, but chroma remains 1 or 2 at a depth of 5 feet or more
Chroma—1 or 2 (if value is 2 or if overwash)
Texture—silt loam or silty clay loam
Content of clay—22 to 30 percent
Reaction—moderately acid to neutral

AC horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam
Content of clay—24 to 28 percent
Reaction—slightly acid or neutral
Thickness—7 to 16 inches

C horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam
Content of clay—24 to 28 percent
Reaction—slightly acid or neutral
Special features—few fine concretions or fine faint to distinct dark yellowish brown, dark brown, strong brown, and grayish brown mottles in some pedons

Kezan Series

The Kezan series consists of very deep, poorly drained, moderately permeable soils that formed in silty alluvial sediments derived from loess. These soils are on flood plains along narrow upland drainageways. Slopes range from 0 to 2 percent. The mean annual temperature is about 50 degrees F, and the mean annual precipitation is about 28 inches at the type location.

Taxonomic classification: Fine-silty, mixed, superactive, nonacid, mesic Mollic Fluvaquents

Typical Pedon

Kezan silt loam, on a north-facing slope of 1 percent, in an alfalfa field 3 miles west of Brainard, in Butler County, Nebraska; 1,360 feet south and 200 feet east of the northwest corner of sec. 14, T. 14 N., R. 3 E.

When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

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

C—6 to 13 inches; stratified grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) moist; massive with evident bedding planes; slightly hard, friable; few fine prominent reddish brown (5YR 4/4) iron masses in the soil matrix; neutral; abrupt smooth boundary.

Cg1—13 to 19 inches; stratified dark gray (10YR 4/1) and grayish brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) moist; massive with evident bedding planes; slightly hard, friable; few fine prominent reddish brown (5YR 4/4) iron masses in the soil matrix; neutral; abrupt smooth boundary.

Cg2—19 to 32 inches; stratified grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) moist; massive with evident bedding planes; slightly hard, friable; few fine prominent reddish brown (5YR 4/4) iron masses in the soil matrix; neutral; abrupt smooth boundary.

Agb1—32 to 44 inches; dark gray (10YR 4/1) silt loam, very dark gray (10YR 3/1) moist; massive; hard, friable; neutral; gradual wavy boundary.

Agb2—44 to 60 inches; dark gray (N 4/0) silt loam, black (N 2/0) moist; massive; hard, friable; neutral.

Range in Characteristics

Soil moisture regime: Aquic; the soil moisture control section is wet from a depth of 6 to 18 inches to more than 72 inches from November to June.

Depth to redoximorphic concentrations: 4 to 9 inches

Depth to endosaturation: 6 to 18 inches from November to June

Content of clay in the particle-size control section (weighted average): 24 to 35 percent

Content of sand in the particle-size control section (weighted average): 2 to 12 percent

Other features: Typically, free calcium carbonate is not present in the profile, but in some pedons it occurs at a depth of 12 to 30 inches.

A horizon:
- Hue—10YR
- Value—4 or 5 dry, 2 or 3 moist
- Chroma—1 or 2
- Texture—silt loam or silty clay loam
- Content of clay—20 to 27 percent
- Reaction—neutral or slightly alkaline
- Reaction in calcareous overwash phase—slightly alkaline or moderately alkaline

C and Cg horizons:
- Hue—10YR or 2.5Y
- Value—4 to 6 dry, 2 to 5 moist
- Chroma—1 or 2 dry or moist
- Redoximorphic concentrations—hue of 7.5YR or 5YR, value of 4, and chroma of 4
- Texture—silt loam or silty clay loam
- Content of clay—24 to 35 percent
- Reaction—neutral to moderately alkaline

Agb horizon (if it occurs):
- Hue—10YR, 2.5Y, or N
- Value—3 or 4 dry, 2 or 3 moist
- Chroma—0 or 1
- Redoximorphic concentrations—hue of 7.5YR or 5YR, value of 4, and chroma of 4
- Texture—silt loam or silty clay loam
- Content of clay—24 to 35 percent
- Reaction—neutral to moderately alkaline

Kipson Series

The Kipson series consists of shallow and very shallow, moderately permeable soils on uplands. These soils formed in residuum derived from calcareous silty shales. They are somewhat excessively drained. The mean annual precipitation ranges from 25 to 33 inches, and the mean annual air temperature ranges from 25 to 33 inches F.

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Udorthentic Haplustolls

Typical Pedon

Kipson silty clay loam, on a slope of 6 percent, in an area of native grassland about 20 miles west of Council Grove, in Morris County, Kansas; 75 feet north and 2,330 feet west of the southeast corner of sec. 29, T. 16 S., R. 5 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 8 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate medium and fine granular structure; slightly hard, friable; many fine and very fine roots; strong effervescence; moderately alkaline; clear smooth boundary.

AC—8 to 13 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak fine subangular

blocky structure; slightly hard, friable; common fine and very fine roots; 10 percent gravel, mostly shale; violent effervescence; moderately alkaline; clear wavy boundary.

C—13 to 19 inches; yellow (10YR 7/6) and very pale brown (10YR 7/3) channery silty clay loam, brownish yellow (10YR 6/6) and pale brown (10YR 6/3) moist; massive; slightly hard, friable; few fine and very fine roots; roots spread horizontally on contact with Cr horizon; 30 percent gravel, mostly shale; violent effervescence; moderately alkaline; clear smooth boundary.

Cr—19 to 30 inches; very pale brown (10YR 7/4) and yellow (10YR 7/6) shale and chalky limestone.

Range in Characteristics

Depth to paralithic contact: 6 to 20 inches to silty shale
Depth to secondary calcium carbonate: 0 to 9 inches
Thickness of the mollic epipedon: 6 to 12 inches
Content of clay in the particle-size control section (weighted average): 15 to 35 percent
Content of sand in the particle-size control section (weighted average): 15 to 52 percent

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2 dry or moist
Texture—silt loam or silty clay loam
Content of clay—15 to 35 percent
Reaction—neutral to moderately alkaline

C horizon:
Hue—2.5YR to 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 6 dry or moist
Texture—channery silt loam, channery silty clay loam, channery loam, silt loam, silty clay loam, or loam
Content of clay—18 to 35 percent
Content of pararock fragments—0 to 35 percent, by volume
Reaction—moderately alkaline or strongly alkaline

Lancaster Series

The Lancaster series consists of well drained, moderately permeable soils on uplands. These soils are moderately deep over sandstones or sandy shales. They formed in residuum derived from noncalcareous sandstone and sandy shales. Slopes range from 1 to 16 percent. The mean annual precipitation ranges from 24 to 30 inches, and the mean annual air temperature ranges from 53 to 57 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Udic Argiustolls

Typical Pedon

Lancaster loam, in an area of native range about 2 miles north and 1.25 miles west of Bavaria, in Saline County, Kansas; 175 feet north and 45 feet west of the southeast corner of sec. 17, T. 14 S., R. 4 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium granular structure; hard, friable, slightly plastic and slightly sticky; moderately acid; few fine roots: gradual smooth boundary.

BA—9 to 16 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, slightly plastic and slightly sticky; few fine roots; less than 5 percent hard sandstone fragments about 2 mm to 1 inch in diameter; moderately acid; gradual smooth boundary.

Bt1—16 to 24 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, plastic and sticky; few fine roots; slightly darker clay films on vertical faces of peds and in root channels; slightly acid; gradual smooth boundary.

Bt2—24 to 30 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) moist; streaked and splotched with colors that are more yellow and more gray than the soil mass and with few distinct reddish spots; weak medium subangular blocky structure; very hard, firm, plastic and sticky; few fine roots; darker clay films on some faces of peds; neutral; gradual smooth boundary.

Cr—30 inches; partially weathered, sandy shale.

Range in Characteristics

Soil moisture regime: Ustic
Depth to paralithic contact: 20 to 40 inches to sandstone or shale
Depth to argillic horizon: 6 to 20 inches
Thickness of the mollic epipedon: 8 to 20 inches
Content of clay in the particle-size control section (weighted average): 18 to 35 percent
Content of sand in the particle-size control section (weighted average): 20 to 80 percent
Content of pararock fragments 2 mm to 3 inches in

diameter in the particle-size control section (weighted average): 0 to 15 percent, by volume
Content of pararock fragments 3 to 10 inches in diameter in the particle-size control section (weighted average): 0 to 5 percent, by volume
Kind of pararock fragments in the particle-size control section: Weathered sandstone

A horizon:
Hue—10YR or 7.5YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3 dry or moist
Texture—loam, sandy loam, fine sandy loam, or gravelly loam
Content of clay—5 to 26 percent
Content of pararock fragments—0 to 15 percent
Reaction—moderately acid or slightly acid

Bt horizon:
Hue—10YR to 5YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—3 to 6 dry or moist
Texture—loam, clay loam, or sandy clay loam
Content of clay—18 to 35 percent
Content of pararock fragments—0 to 15 percent
Reaction—moderately acid to neutral

C horizon (if it occurs):
Hue—7.5YR or 5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—4 to 6 dry or moist (variegations of colors more gray, yellow, or red than the soil matrix occur below a depth of 20 inches; the colors are presumed to be inherited from the parent material)
Texture—sandy clay loam, clay loam, fine sandy loam, or loam
Content of clay—12 to 30 percent
Content of pararock fragments—0 to 15 percent
Reaction—slightly acid or neutral

Malmo Series

The Malmo series consists of very deep, moderately well drained soils on uplands. These soils formed in weathered glacial till. Permeability is very slow. Slopes range from 2 to 11 percent. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 52 degrees F at the type location.

Taxonomic classification: Fine, smectitic, mesic Aquertic Hapludalfs

Typical Pedon

Malmo clay, on a southeast-facing slope of 9 percent, in an area of cropland about 3 miles east and 6 miles north of Tecumseh, in Johnson County, Nebraska; about 1,000 feet west and 100 feet north of the southeast corner of sec. 25, T. 6 N., R. 11 E.; Tecumseh Northwest USGS quadrangle; lat. 40 degrees 27 minutes 3 seconds N. and long. 96 degrees 7 minutes 34 seconds W., NAD 83. (Colors are for moist soil unless otherwise noted.)

Ap—0 to 6 inches; dark brown (7.5YR 3/2) clay, brown (7.5YR 4/3) dry; weak fine granular structure; hard, firm; few fine roots throughout; few fine discontinuous tubular pores; 3 percent rounded mixed metamorphic and sedimentary gravel; slightly acid; clear smooth boundary.
Bt1—6 to 15 inches; 50 percent brown (7.5YR 4/2) and 50 percent yellowish red (5YR 4/6) clay, brown (7.5YR 5/4) and yellowish red (5YR 5/6) dry; moderate fine and medium subangular blocky structure; very hard, very firm; few fine roots throughout; few fine discontinuous tubular pores; discontinuous clay films on faces of peds; 3 percent rounded mixed metamorphic and sedimentary gravel; many medium distinct light gray (10YR 7/2) iron depletions; neutral; clear smooth boundary.
Bt2—15 to 25 inches; 50 percent brown (7.5YR 4/2) and 50 percent yellowish red (5YR 4/6) clay, brown (7.5YR 5/4) and yellowish red (5YR 5/6) dry; moderate fine and medium subangular blocky structure; very hard, very firm; few fine roots throughout; few fine discontinuous tubular pores; discontinuous clay films on faces of peds; few fine and medium irregular carbonate concretions throughout; 3 percent rounded mixed metamorphic and sedimentary gravel; many medium distinct grayish brown (10YR 5/2) iron depletions; slightly alkaline; clear smooth boundary.
Bt3—25 to 39 inches; yellowish red (5YR 5/8) clay, reddish yellow (5YR 6/8) dry; moderate medium angular blocky structure; very hard, very firm; discontinuous clay films on faces of peds; few medium irregular carbonate concretions; 3 percent rounded mixed metamorphic and sedimentary gravel; many coarse prominent grayish brown (10YR 5/2) iron depletions; slightly alkaline; clear smooth boundary.
Bt4—39 to 43 inches; yellowish red (5YR 5/8) gravelly clay, reddish yellow (5YR 6/8) dry; weak medium angular blocky structure; very hard, very firm; discontinuous clay films on faces of peds; few medium irregular carbonate concretions; 18 percent rounded mixed metamorphic and sedimentary gravel; many coarse prominent

grayish brown (10YR 5/2) iron depletions; moderately alkaline; clear smooth boundary.
BC—43 to 54 inches; yellowish red (5YR 5/8) clay loam, reddish yellow (5YR 6/8) dry; weak medium angular blocky structure; hard, firm; few medium irregular carbonate concretions; 3 percent mixed metamorphic and sedimentary gravel; many coarse prominent grayish brown (10YR 5/2) iron depletions; moderately alkaline; gradual smooth boundary.
C—54 to 80 inches; pale brown (10YR 6/3) loam, very pale brown (10YR 8/4) dry; massive; slightly hard, friable; 4 percent rounded mixed metamorphic and sedimentary gravel; common coarse prominent yellowish red (5YR 5/6) soft masses of iron accumulation; slightly effervescent, moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March through June.
Mean annual soil temperature: 50 to 56 degrees F
Depth to argillic horizon: 4 to 9 inches
Depth to secondary calcium carbonate: 15 to 40 inches
Depth to redoximorphic concentrations: 35 to 90 inches
Depth to redoximorphic depletions: 4 to 9 inches
Depth to episaturation: 12 to 36 inches from March through June
Thickness of the solum: 40 to 72 inches
Content of clay in the particle-size control section (weighted average): 35 to 50 percent
Content of sand in the particle-size control section (weighted average): 20 to 50 percent
Content of rock fragments in the particle-size control section (weighted average): 2 to 25 percent, by volume
Size of rock fragments in the particle-size control section: Gravel

A horizon:
Hue—7.5YR or 10YR
Value—2 to 4 moist, 3 to 5 dry
Chroma—2 or 3
Texture—clay, clay loam, or silty clay loam
Content of clay—35 to 46 percent
Reaction—moderately acid or slightly acid

Bt horizon:
Hue—5YR to 10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 8
Texture—clay, clay loam, gravelly clay, or sandy clay
Content of clay—35 to 50 percent
Content of rock fragments—2 to 25 percent gravel
Reaction—slightly acid to slightly alkaline

BC and C horizons:
Hue—2.5Y to 5YR
Value—4 to 6 moist, 5 to 8 dry
Chroma—2 to 8
Texture—Dominantly clay loam or loam; stratified clay, sandy loam, or silty clay loam included in the range
Content of clay—20 to 45 percent
Content of rock fragments—2 to 25 percent gravel
Reaction—neutral to moderately alkaline

Morrill Series

The Morrill series consists of very deep, well drained soils that formed in loamy glacial till or outwash deposits. These soils are on uplands. Slopes range from 1 to 30 percent. The mean annual precipitation is about 37 inches, and the mean annual temperature is about 53 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Morrill loam, in an area of grassland about 5 miles east and 2½ miles north of Hiawatha, in Brown County, Kansas; 2,475 feet north and 630 feet west of the southeast corner of sec. 7, T. 2 S., R. 18 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; 2 percent mixed pebbles; very strongly acid; clear smooth boundary.
BA—6 to 12 inches; dark brown (10YR 3/3 and 7.5YR 3/4) loam, brown (10YR 4/3) dry; moderate medium granular structure; hard, firm, slightly sticky and slightly plastic; common fine roots; 2 percent mixed pebbles; strongly acid; gradual smooth boundary.
Bt1—12 to 22 inches; dark reddish brown (5YR 3/4) loam, strong brown (7.5YR 4/6) dry; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine roots; many faint discontinuous clay films on faces of peds; 2 percent mixed pebbles; moderately acid; gradual smooth boundary.
Bt2—22 to 30 inches; reddish brown (5YR 4/4) sandy clay loam, brown (7.5YR 5/4) dry; moderate

medium subangular blocky structure; hard, firm, sticky and slightly plastic; common fine roots; many faint discontinuous clay films on faces of peds; 2 percent mixed pebbles; moderately acid; gradual wavy boundary.

Bt3—30 to 35 inches; yellowish red (5YR 4/6) and brown (7.5YR 4/4) sandy clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common faint patchy clay films on faces of peds; 2 percent mixed pebbles; slightly acid; gradual wavy boundary.

Bt4—35 to 43 inches; brown (7.5YR 4/4) and strong brown (7.5YR 4/6) sandy clay loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; few faint patchy clay films on faces of peds; few medium yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

BC—43 to 52 inches; strong brown (7.5YR 4/4) fine sandy loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common medium yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

2C1—52 to 59 inches; strong brown (7.5YR 4/6) fine sandy loam, reddish yellow (7.5YR 6/6) dry; massive; slightly hard, very friable, slightly sticky and nonplastic; many fine yellowish red (5YR 4/6) relict iron stains; 2 percent mixed pebbles; slightly acid; clear wavy boundary.

2C2—59 to 73 inches; strong brown (7.5YR 4/6) loamy fine sand, reddish yellow (7.5YR 6/6) dry; single grain; loose, nonsticky and nonplastic; common coarse strong brown (7.5YR 5/8) and yellowish red (5YR 5/6) relict iron stains; 2 percent mixed pebbles; slightly acid; gradual smooth boundary.

2C3—73 to 80 inches; strong brown (7.5YR 5/6) sand, reddish yellow (7.5YR 6/6) dry; single grain; loose, nonsticky and nonplastic; common coarse and very coarse rounded clay bodies throughout; 2 percent mixed pebbles; slightly acid.

Range in Characteristics

Soil moisture regime: Udic
Depth to argillic horizon: 6 to 23 inches
Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: 30 to 60 inches
Content of clay in the particle-size control section (weighted average): 18 to 35 percent
Content of sand in the particle-size control section (weighted average): Greater than 20 percent
Special feature: A stony phase is recognized.

A horizon:
- Hue—10YR or 7.5YR
- Value—2 or 3 moist, 3 to 5 dry
- Chroma—1 to 3
- Texture—loam, clay loam, stony loam, or very stony loam
- Content of clay—15 to 35 percent
- Content of rock fragments—0 to 14 percent, by volume, pebbles
- Reaction—neutral to very strongly acid

Bt horizon:
- Hue—7.5YR or 5YR
- Value—3 or 4 moist, 4 or 5 dry
- Chroma—3 to 6
- Texture—loam, clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam
- Content of clay—18 to 35 percent
- Content of rock fragments—0 to 20 percent pebbles
- Reaction—neutral to very strongly acid

2C or C horizon:
- Hue—10YR, 7.5YR, or 5YR
- Value—4 or 5 moist, 4 to 6 dry
- Chroma—3 to 6
- Texture—loam, clay loam, fine sandy loam, sandy loam, sandy clay loam, gravelly loam, gravelly clay loam, gravelly sandy loam, gravelly sandy clay loam, loamy fine sand, or sand; strata of clay in a few pedons
- Content of clay—5 to 30 percent
- Content of rock fragments—0 to 20 percent pebbles
- Reaction—neutral to very strongly acid

Muscotah Series

The Muscotah series consists of very deep, somewhat poorly drained soils that formed in clayey alluvium. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual precipitation is about 34 inches, and the mean annual air temperature is about 53 degrees F.

Taxonomic classification: Fine, smectitic, mesic Cumulic Hapludolls

Typical Pedon

Muscotah silty clay loam, in a cultivated area about 4 miles south and 1 mile west of Muscotah, in Brown County, Kansas; 230 feet west and 500 feet north of

the southeast corner of sec. 18, T. 4 S., R. 16 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; common fine roots throughout; neutral; clear wavy boundary.

A1—9 to 16 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; very hard, friable, sticky and plastic; few very fine roots throughout; neutral; gradual smooth boundary.

A2—16 to 23 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots throughout; few fine prominent yellowish brown (10YR 5/6) soft masses of iron accumulation; neutral; clear smooth boundary.

Bw1—23 to 35 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots throughout; few distinct slickensides; common fine prominent yellowish brown (10YR 5/6) soft masses of iron accumulation; neutral; gradual smooth boundary.

Bw2—35 to 44 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common distinct slickensides; common fine distinct dark yellowish brown (10YR 4/4) soft masses of iron accumulation; neutral; gradual smooth boundary.

Bw3—44 to 60 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; very hard, very firm, very sticky and very plastic; common distinct slickensides; few fine rounded iron-manganese concretions; common fine faint very dark grayish brown (10YR 3/2) iron depletions; neutral; gradual wavy boundary.

Bw4—60 to 70 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common distinct discontinuous intersecting slickensides; few fine rounded iron-manganese concretions and few medium irregular carbonate nodules; common medium distinct dark grayish brown (2.5Y 4/2) iron depletions; neutral; gradual wavy boundary.

Bg—70 to 80 inches; olive gray (5Y 4/2) silty clay, olive gray (5Y 5/2) dry; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; free water at a depth of 75 inches; common distinct discontinuous intersecting slickensides; common fine prominent olive brown (2.5Y 4/4) soft masses of iron accumulation; few fine rounded iron-manganese concretions and common fine and medium irregular carbonate nodules; neutral.

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: More than 30 inches
Depth to redoximorphic concentrations: 16 to 24 inches
Thickness of the mollic epipedon: More than 36 inches
Content of clay in the particle-size control section (weighted average): 35 to 50 percent
Content of sand in the particle-size control section (weighted average): Less than 20 percent
Other features: A silty overwash phase is recognized; some pedons have a Cg horizon.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay loam
Content of clay—27 to 40 percent; 18 to 27 percent in silty overwash phase
Reaction—moderately acid to neutral

Bw horizon:
Hue—10YR or 2.5Y
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—35 to 50 percent
Content of sand—less than 10 percent
Reaction—moderately acid to slightly alkaline

Bg horizon:
Hue—2.5Y to 5Y
Value—2 to 5 moist, 3 to 6 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—35 to 50 percent
Content of sand—less than 10 percent
Reaction—neutral or slightly alkaline

Nodaway Series

The Nodaway series consists of very deep, moderately well drained soils that formed in alluvium. These soils are on flood plains. Slopes range from 0 to 2 percent. The mean annual air temperature is about

50 degrees F, and the mean annual precipitation is about 30 inches.

Taxonomic classification: Fine-silty, mixed, superactive, nonacid, mesic Mollic Udifluvents

Typical Pedon

Nodaway silt loam, nearly level, on a flood plain in a cultivated field about 3 miles east of Firth, in Lancaster County, Nebraska; 100 feet north and 1,000 feet east of the southwest corner of sec. 29, T. 7 N., R. 8 E.; Firth USGS topographic quadrangle; lat. 40 degrees 32 minutes 19 seconds N. and long. 96 degrees 33 minutes 18 seconds W. (Colors are for moist soil unless otherwise indicated.)

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

C1—7 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable; few fine dark grayish brown (10YR 4/2) strata; some weak platiness; few fine roots throughout; few fine tubular pores; slightly acid; clear smooth boundary.

C2—14 to 45 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable; some platiness due to stratification; many fine and medium dark grayish brown (10YR 4/2) strata; few fine roots throughout; few fine tubular pores; slightly acid; clear smooth boundary.

C3—45 to 60 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; massive; slightly hard, friable; few fine roots throughout; few fine tubular pores; neutral.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is moist in some parts from February to November.

Depth to buried soil (if it occurs): Greater than 36 inches

Depth to redoximorphic concentrations: 6 to 10 inches

Content of clay in the particle-size control section (weighted average): 18 to 28 percent

Content of sand in the particle-size control section (weighted average): Less than 15 percent

Other features: A silty clay substratum phase is recognized.

Ap horizon:
- Hue—10YR
- Value—3
- Chroma—1 or 2
- Texture—silt loam
- Content of clay—18 to 30 percent
- Reaction—slightly acid or neutral

C horizon:
- Hue—10YR
- Value—3 or 4
- Chroma—1 or 2
- Texture—silt loam or silty clay loam; only very thin lenses of material coarser than silt loam are permitted at a depth of about 40 inches; some pedons are sandy below a depth of 40 inches
- Content of clay—18 to 28 percent
- Reaction—slightly acid or neutral
- Other features—few or common of both high and low chroma; some strata have hue of 10YR, value of 4 or 5, and chroma of 2, 3, or 4; dark, medium textured or moderately fine textured buried soils below a depth of 36 inches in some pedons

Otoe Series

The Otoe series consists of very deep, moderately well drained soils that formed in loess over glacial till. These soils are on loess-covered glaciated uplands. Slopes range from 2 to 11 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 33 inches at the type location.

Taxonomic classification: Fine, smectitic, mesic Aquertic Hapludalfs

Typical Pedon

Otoe silty clay loam, on a convex, southwest-facing slope of 8 percent, in a cultivated field about 2 miles south and 3 miles west of Cortland, in Gage County, Nebraska; 2,250 feet south and 1,050 feet east of the northwest corner of sec. 21, T. 6 N., R. 6 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; silty clay loam, very dark grayish brown (10YR 3/2) crushed, and dark grayish brown (10YR 4/2) dry; moderate fine granular structure; hard, friable; common very fine and fine roots throughout; common very fine tubular pores; strongly acid; abrupt smooth boundary.

Bt1—6 to 15 inches; silty clay, 80 percent dark grayish brown (10YR 4/2) crushed and 20 percent brown (10YR 5/3) crushed, grayish brown (10YR 5/2) and pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; very hard, firm;

common very fine and fine roots throughout; many very fine tubular pores; continuous clay films on vertical and horizontal faces of peds and common very dark gray (10YR 3/1) organic coats on faces of peds and in pores; few fine irregular yellowish brown (10YR 5/6) soft masses of iron accumulation, few fine and medium rounded light gray (2.5Y 7/2) iron depletions, and few fine rounded masses of iron-manganese concretions; slightly acid; clear smooth boundary.

Bt2—15 to 22 inches; silty clay, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine roots between peds; many very fine and fine tubular pores; continuous clay films on vertical and horizontal faces of peds and few faint very dark gray (10YR 3/1) organic coats; few fine irregular yellowish brown (10YR 5/6) soft masses of iron accumulation and few fine rounded soft masses of iron-manganese concretions; slightly acid; clear smooth boundary.

Bt3—22 to 32 inches; silty clay, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm; common fine roots in cracks; common fine tubular pores; continuous clay films on vertical and horizontal faces of peds; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation and common very coarse irregular gray (2.5Y 6/1) iron depletions; slightly acid; gradual wavy boundary.

BC—32 to 40 inches; silty clay loam, light olive brown (2.5Y 5/3) crushed, light yellowish brown (2.5Y 6/3) dry; moderate medium subangular blocky structure; very hard, firm; common very fine roots in cracks; common fine tubular pores; patchy clay films on faces of peds; many medium and coarse irregular yellowish brown (10YR 5/8) soft masses of iron accumulation and common rounded soft masses of iron manganese concretions; slightly acid; gradual wavy boundary.

C1—40 to 50 inches; silty clay loam, gray (5Y 5/1) crushed, light gray (2.5Y 7/2) dry; massive; hard, friable; common fine roots in cracks; common fine tubular pores; common medium and coarse irregular yellowish brown (10YR 5/8) soft masses of iron accumulation and few coarse cylindrical iron concretions throughout; neutral; gradual wavy boundary.

C2—50 to 57 inches; silty clay loam, brown (7.5YR 5/2) crushed, pinkish gray (7.5YR 6/2) dry; massive; hard, friable; common very fine roots in cracks; common fine tubular pores; many medium and coarse irregular yellowish brown (10YR 5/8) masses of iron accumulation and common rounded soft masses of iron-manganese concretions; neutral; gradual wavy boundary.

2C3—57 to 80 inches; clay loam, brown (7.5YR 4/3) crushed, brown (7.5YR 5/3) dry; massive; hard, friable; common very fine roots in cracks; common fine tubular pores; common fine irregular yellowish brown (10YR 5/6) masses of iron accumulation and common rounded soft masses of iron-manganese concretions; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March to May.

Mean annual soil temperature: 51 to 56 degrees F

Depth to argillic horizon: 3 to 7 inches

Depth to secondary calcium carbonate (if it occurs): 30 to 50 inches

Depth to redoximorphic concentrations: 3 to 7 inches

Depth to redoximorphic depletions: 3 to 7 inches

Depth to episaturation: 12 to 36 inches from March to May

Thickness of the solum: 18 to 53 inches

Vertic features: Linear extensibility of 6.0 cm or more at a depth of 3 to 32 inches

Content of clay in the particle-size control section (weighted average): 35 to 55 percent

Content of sand in the particle-size control section (weighted average): 1 to 10 percent

Other features: A BC horizon in some pedons

A horizon:

Hue—10YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—35 to 45 percent
Reaction—strongly acid to slightly acid

Bt horizon:

Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8
Redoximorphic depletions—hue of 10YR or 2.5Y, value of 5 or 6, and chroma of less than 2
Texture—silty clay or silty clay loam
Content of clay—35 to 55 percent
Reaction—moderately acid to neutral

C horizon:

Hue—7.5YR, 2.5Y, or 5Y

Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2
Redoximorphic concentrations—hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8
Texture—silty clay loam or silt loam
Content of clay—27 to 40 percent
Reaction—slightly acid to moderately alkaline

2C horizon (typically below a depth of 40 inches):
Hue—7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6
Redoximorphic concentrations—hue of 10YR, 7.5YR, or 5YR; value of 4 to 6; and chroma of 6 or 8
Texture—clay loam, silty clay loam, or clay
Content of clay—27 to 45 percent
Reaction—neutral or slightly alkaline

Padonia Series

The Padonia series consists of well drained soils that formed in loess. These soils are on uplands. They are moderately deep over clayey residuum derived from calcareous shale. Slopes range from 3 to 25 percent. The mean annual precipitation is about 34 inches, and the mean annual air temperature is about 53 degrees F.

Taxonomic classification: Fine, mixed, superactive, mesic Typic Argiudolls

Typical Pedon

Padonia silty clay loam, on a slope of 6 percent, in an area of native pasture about 5 miles west and 4 miles north of Morrill, in Brown County, Kansas; 1,250 feet east and 400 feet north of the southwest corner of sec. 6, T. 1 S., R. 15 E. (Colors are for moist soil unless otherwise indicated.)

A1—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable, hard, sticky and plastic; common fine roots throughout; slightly acid; clear smooth boundary.
A2—6 to 11 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 4/3) dry; weak fine subangular blocky structure; firm, very hard, sticky and plastic; common fine roots throughout; neutral; gradual smooth boundary.
Bt—11 to 22 inches; dark brown (10YR 4/3) silty clay, brown (10YR 5/3) dry; moderate fine subangular blocky structure; very firm, very hard, very sticky and very plastic; few faint continuous clay films; few fine roots throughout; neutral; gradual smooth boundary.
Btk—22 to 32 inches; 70 percent dark yellowish brown (10YR 4/4) and 30 percent olive gray (5Y 4/2) silty clay; 70 percent yellowish brown (10YR 5/4) and 30 percent olive gray (5Y 5/2) dry; moderate fine subangular blocky structure; very firm, very hard, very sticky and very plastic; few faint continuous clay films; few fine roots throughout; few fine rounded carbonate nodules; slightly alkaline; gradual wavy boundary.
BCk—32 to 37 inches; olive gray (5Y 5/2) silty clay loam, light olive gray (5Y 6/2) dry; weak fine subangular blocky structure; firm, hard, sticky and plastic; few fine roots throughout; strongly effervescent; few fine rounded carbonate nodules; moderately alkaline; gradual wavy boundary.
Cr—37 inches; light olive gray (5Y 6/2) (dry), partially weathered, calcareous shale.

Range in Characteristics

Soil moisture regime: Udic
Depth to paralithic contact: 20 to 40 inches to calcareous shale
Depth to argillic horizon: 6 to 12 inches
Depth to secondary calcium carbonate: 12 to 24 inches
Thickness of the mollic epipedon: 7 to 20 inches
Content of clay in the particle-size control section (weighted average): 35 to 50 percent
Content of sand in the particle-size control section (weighted average): 2 to 15 percent
Other features: Carbonates occur in the form of concretions, films, or threads, but they occur only in the form of concretions at a depth of less than 28 inches. The wide range in color is considered to be inherent of the varicolored shale.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 to 3
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—Dominantly slightly acid or neutral; slightly acid to strongly acid in areas of cropland

Bt horizon:
Hue—10YR in the upper part and 2.5Y or 5Y in the lower part
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 6
Texture—silty clay, clay, or silty clay loam
Content of clay—35 to 50 percent
Reaction—slightly acid to slightly alkaline

Btk horizon:
Hue—2.5Y or 5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 6
Texture—silty clay, clay, or silty clay loam
Content of clay—35 to 50 percent
Reaction—slightly alkaline or moderately alkaline

BCk horizon (if it occurs):
Hue—2.5Y or 5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4 moist or dry
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—slightly alkaline or moderately alkaline

Pawnee Series

The Pawnee series consists of very deep, moderately well drained soils that formed in glacial till. These soils are on uplands. Permeability is slow or very slow. Slopes range from 0 to 12 percent. The mean annual precipitation is about 30 inches, and the mean annual temperature is about 54 degrees F.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Pawnee loam, in a cultivated area about 4 miles north of Pawnee City, in Pawnee County, Nebraska; 1,585 feet west and 350 feet south of the northeast corner of sec. 2, T. 2 N., R. 11 E.; Steinauer USGS topographic quadrangle; lat. 40 degrees 10 minutes 27 seconds N. and long. 96 degrees 8 minutes 5 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and very fine granular structure; many fine and medium and few coarse roots throughout; common fine tubular pores; slightly hard, friable; moderately acid; abrupt smooth boundary.

A—6 to 10 inches; very dark brown (10YR 2/2) clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; many fine and medium and few coarse roots throughout; common fine tubular pores; slightly hard, friable; moderately acid; clear smooth boundary.

BA—10 to 14 inches; dark brown (10YR 3/3) clay loam, dark yellowish brown (10YR 3/4) dry; moderate fine and medium subangular blocky structure; hard, friable; common fine and few medium roots throughout; common fine tubular pores; few fine prominent dark reddish brown (5YR 3/4) iron masses; moderately acid; gradual smooth boundary.

Bt1—14 to 24 inches; dark grayish brown (10YR 4/2) clay, brown (10YR 4/3) dry; moderate medium and coarse subangular blocky structure; extremely hard, very firm; common fine and few medium roots throughout; common fine tubular pores; thin continuous organic coatings on faces of peds; 2 percent gravel, by volume; few fine and medium prominent reddish brown (5YR 4/4) iron masses; slightly acid; gradual smooth boundary.

Bt2—24 to 32 inches; brown (10YR 4/3) clay, dark yellowish brown (10YR 4/4) dry; weak coarse subangular blocky structure; extremely hard, very firm; few fine and medium roots throughout; few fine tubular pores; thin continuous organic coatings on faces of peds; 2 percent gravel, by volume; common medium faint grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) and prominent reddish brown (5YR 5/4) iron masses; neutral; gradual smooth boundary.

Bt3—32 to 45 inches; olive brown (2.5Y 4/4) clay, light olive brown (2.5Y 5/4) dry; weak coarse subangular blocky structure; very hard, very firm; few fine and medium roots throughout; few fine tubular pores; thin patchy organic coatings on faces of peds; 2 percent gravel, by volume; many medium distinct grayish brown (10YR 5/2) and prominent brown (7.5YR 5/4) iron masses; moderately alkaline; gradual smooth boundary.

BC—45 to 53 inches; mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) clay, light olive brown (2.5Y 5/4) and dark yellowish brown (10YR 4/4) dry; weak medium subangular blocky structure; very hard, very firm; few fine and medium roots throughout; few fine tubular pores; few medium lime concretions; 2 percent gravel, by volume; many medium prominent dark brown (7.5YR 4/4) iron masses; moderately alkaline; clear smooth boundary.

C—53 to 80 inches; grayish brown (2.5Y 5/2) clay loam, light olive brown (2.5Y 5/4) dry; massive; small iron and manganese concretions; 2 percent gravel, by volume; few medium and large soft masses of lime; many coarse distinct grayish brown (10YR 5/2) iron masses; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March through May.
Mean annual soil temperature: 51 to 56 degrees F
Depth to argillic horizon: 7 to 19 inches

Depth to secondary calcium carbonate: 29 to 54 inches
Depth to redoximorphic concentrations: 7 to 13 inches
Depth to episaturation: 12 to 36 inches from March to May
Thickness of the mollic epipedon: 10 to 19 inches; commonly includes the upper part of the B horizon
Thickness of the solum: 40 to 60 inches
Content of clay in the particle-size control section (weighted average): 40 to 48 percent
Content of sand in the particle-size control section (weighted average): 20 to 45 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 5 percent, by volume
Size of rock fragments in the particle-size control section: Gravel
Other features: Some pedons have a BA horizon.

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 or 2
Texture—loam, clay loam, or clay
Content of clay—15 to 41 percent
Reaction—moderately acid to neutral

Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5 moist, 3 to 6 dry
Chroma—2 to 4
Redoximorphic concentrations—hue of 7.5YR or 5YR, value of less than 5, and chroma of less than 6
Texture—clay
Content of clay—40 to 48 percent
Content of rock fragments—0 to 5 percent gravel
Reaction—slightly acid to moderately alkaline

BC horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6 moist or dry
Chroma—2 to 6
Redoximorphic concentrations—hue of 7.5YR or 5YR, value of less than 5, and chroma of less than 4
Texture—clay
Content of clay—40 to 48 percent
Content of rock fragments—0 to 5 percent gravel
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—5 moist, 5 or 6 dry
Chroma—0 to 4
Redoximorphic concentrations—hue of 10YR, 7.5YR, or 5YR; value of less than 5; and chroma of less than 4
Texture—clay loam, sandy clay loam, or loam
Content of clay—15 to 40 percent
Content of rock fragments—0 to 5 percent, by volume
Reaction—slightly alkaline or moderately alkaline

Sogn Series

The Sogn series consists of shallow and very shallow, somewhat excessively drained soils that formed in residuum derived from limestone. These soils are on uplands. Slopes range from 0 to 20 percent. The mean annual precipitation is about 32 inches, and the mean annual temperature is about 55 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplustolls

Typical Pedon

Sogn silty clay loam, in an area of rangeland about 10 miles east and 1 mile south of Junction City, in Geary County, Kansas; 300 feet east and 50 feet south of the northwest corner of sec. 15, T. 12 S., R. 7 E. (Colors are for dry soil unless otherwise indicated.)

A—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium granular structure; hard, friable; few fragments of weathered limestone in the lower 3 inches making up less than 15 percent of the soil volume; strong effervescence; moderately alkaline; abrupt smooth boundary.
R—9 inches; level-bedded, indurated limestone that has joints averaging about 18 inches apart and less than 1/4 inch wide; cracks are filled with dark soil.

Range in Characteristics

Soil moisture regime: Ustic bordering on Udic
Depth to lithic contact: 4 to 20 inches to limestone bedrock
Thickness of the mollic epipedon: 4 to 20 inches
Content of clay in the particle-size control section (weighted average): 20 to 35 percent
Content of sand in the particle-size control section (weighted average): 2 to 35 percent
Content of rock fragments in the particle-size control section (weighted average): Less than 35 percent
Size of rock fragments in the particle-size control section: Pebbles and channers

Kind of rock fragments in the particle-size control section: Limestone
Other features: Some pedons do not contain free carbonates above the bedrock. Some pedons have an AC or C horizon, which has colors similar to those of the A horizon and is channery silt loam or channery silty clay loam.

A horizon:
Hue—7.5YR to 2.5Y
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 to 3 dry or moist
Texture—silty clay loam, loam, silt loam, or clay loam
Content of clay—20 to 35 percent
Content of rock fragments—less than 35 percent
Reaction—slightly acid to moderately alkaline

Steinauer Series

The Steinauer series consists of very deep, well drained soils that formed in calcareous glacial till. These soils are on uplands. Permeability is moderately slow. Slopes range from 5 to 60 percent. The mean annual temperature is about 52 degrees F, and the mean annual precipitation is about 28 inches.

Taxonomic classification: Fine-loamy, mixed, superactive, calcareous, mesic Typic Udorthents

Typical Pedon

Steinauer clay loam, on a convex, east-facing slope of 9 percent, in a pasture about 3 miles south and 1/2 mile west of Garland, in Seward County, Nebraska; 1,050 feet south and 2,375 feet west of the northeast corner of sec. 29, T. 11 N., R. 4 E.; Garland USGS topographic quadrangle; lat. 40 degrees 53 minutes 54 seconds N. and long. 96 degrees 59 minutes 42 seconds W. When described, the soil was moist to a depth of 41 inches. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable; common fine and medium roots; common fine and medium tubular pores; slight effervescence; slightly alkaline; abrupt smooth boundary.
AC—6 to 15 inches; gray (10YR 5/1) clay loam, light gray (10YR 6/1) dry; weak coarse and medium subangular blocky structure parting to moderate fine subangular blocky; hard, firm; common fine and medium roots; common fine and medium tubular pores; violent effervescence; moderately alkaline; clear smooth boundary.
C1—15 to 41 inches; grayish brown (10YR 5/2) clay loam, light brownish gray (10YR 6/2) dry; massive with common medium or strong angular planes of cleavage; hard, firm; few fine roots and tubular pores; many iron and manganese concretions; many fine and medium pockets or seams of soft lime; violent effervescence; many coarse prominent reddish brown (5YR 4/4) iron masses in the matrix, which are relict redoximorphic features; moderately alkaline; diffuse smooth boundary.
C2—41 to 60 inches; yellowish brown (10YR 5/4) clay loam, light yellowish brown (10YR 6/4) dry; massive with many medium angular planes of cleavage; hard, firm; few fine roots and tubular pores; many iron and manganese concretions; common medium pockets or seams of soft lime; violent effervescence; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 56 degrees F
Depth to secondary calcium carbonate: 0 to 10 inches
Thickness of the solum: 4 to 21 inches
Content of clay in the particle-size control section (weighted average): 24 to 35 percent
Content of sand in the particle-size control section (weighted average): 20 to 52 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 10 percent, by volume
Size of rock fragments in the particle-size control section: Gravel and cobbles
Kind of rock fragments in the particle-size control section: Mixed

A horizon:
Hue—10YR
Value—2 to 5 moist, 3 to 6 dry
Chroma—1 or 2
Texture—clay loam or loam
Content of clay—16 to 32 percent
Content of rock fragments—0 to 10 percent, by volume
Reaction—slightly alkaline or moderately alkaline

AC horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5 moist, 5 or 6 dry
Chroma—1 to 4
Texture—clay loam or loam
Content of clay—24 to 35 percent
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6 moist, 6 or 7 dry
Chroma—2 to 4
Texture—clay loam or loam
Content of clay—24 to 35 percent
Content of rock fragments—0 to 10 percent, by volume, gravel, cobbles, or stones
Reaction—slightly alkaline or moderately alkaline

Wymore Series

The Wymore series consists of very deep, moderately well drained soils that formed in loess. These soils are on uplands. Permeability is slow or very slow. Slopes range from 0 to 17 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 33 inches near the type location.

Taxonomic classification: Fine, smectitic, mesic Aquertic Argiudolls

Typical Pedon

Wymore silty clay loam, on a convex, southwest-facing slope of 4 percent, in a cultivated field about 1 mile east and 1 mile south of Pawnee City, in Pawnee County, Nebraska; 1,170 feet west and 580 feet south of the northeast corner of sec. 1, T. 1 N., R. 11 E. When described, the soil was moist throughout. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; very dark brown (10YR 2/2) silty clay loam, dark gray (10YR 4/1) dry; weak medium granular structure; slightly hard, friable; moderately acid; abrupt smooth boundary.
BA—5 to 9 inches; very dark brown (10YR 2/2) silty clay, very dark grayish brown (10YR 3/2) dry; moderate very fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; moderately acid; clear smooth boundary.
Bt1—9 to 17 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; moderate medium and fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; moderately acid; clear smooth boundary.
Bt2—17 to 25 inches; dark grayish brown (10YR 4/2) silty clay, dark yellowish brown (10YR 4/4) dry; moderate medium and fine subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; few fine distinct reddish brown (5YR 5/4) and dark yellowish brown (10YR 4/4) iron masses; slightly acid; gradual smooth boundary.
Bt3—25 to 32 inches; grayish brown (2.5Y 5/2) silty clay, brown (10YR 5/3) dry; moderate medium subangular blocky structure; hard, firm; thin continuous clay films on faces of peds; common fine distinct dark yellowish brown (10YR 4/4) iron masses; slightly acid; clear smooth boundary.
BC—32 to 40 inches; mixed olive brown (2.5Y 4/4) and grayish brown (2.5Y 5/2) silty clay loam, grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) dry; moderate medium and fine subangular blocky structure; slightly hard, friable; thin discontinuous clay films on faces of peds; common fine reddish brown (5YR 4/4) iron and manganese concretions; few fine distinct yellowish brown (10YR 5/4) iron masses; neutral; clear smooth boundary.
C—40 to 53 inches; gray (5Y 5/1) silty clay loam, light brownish gray (2.5Y 6/2) dry; weak medium and coarse subangular blocky structure; slightly hard, friable; few fine pipelike iron concretions; few lime concretions; neutral; abrupt smooth boundary.
Ab—53 to 80 inches; dark brown (7.5YR 4/2) silty clay loam, brown (10YR 5/3) dry; weak thin platy structure; soft, very friable; neutral.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is wet from March to April.
Mean annual soil temperature: 50 to 59 degrees F
Depth to argillic horizon: 4 to 15 inches
Depth to secondary calcium carbonate (if it occurs): 30 to 50 inches
Depth to redoximorphic concentrations: 12 to 24 inches
Depth to episaturation: 12 to 36 inches from March to April
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the solum: 33 to 50 inches
Vertic features: Linear extensibility of 6.0 cm or more at a depth of 4 to 39 inches
Content of clay in the particle-size control section (weighted average): 42 to 55 percent
Content of sand in the particle-size control section (weighted average): 0 to 5 percent
Other features: Redoximorphic features in the form of iron masses and iron and manganese concretions with hue of 5YR, 7.5YR, or 10YR, value of 2 to 5, and chroma of 1 to 8 in the lower part of the particle-size control section and in the underlying layers

A horizon:
Hue—10YR
Value—2 or 3 moist, 3 or 4 dry

Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—27 to 50 percent
Reaction—moderately acid to slightly acid

Bt horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Texture—silty clay
Content of clay—42 to 55 percent
Reaction—moderately acid to neutral
Other features—Redoximorphic features are not evident or are masked by the matrix color in the lower part of the Bt horizon in some pedons

C horizon:
Hue—2.5Y or 5Y
Value—5 or 6 moist, 6 or 7 dry
Chroma—1 or 2
Texture—silty clay loam
Content of clay—27 to 40 percent
Reaction—neutral or slightly akaline

Formation of the Soils

This section describes how the factors of soil formation have affected the soils in Gage County.

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic activity. The characteristics of the soil at any given point are determined by: (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil formation have acted on the soil material.

The active factors of soil formation are climate and animal and plant life (mainly plants). These factors act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and animal and plant life are conditioned by relief. The parent material also influences the kind of soil profile that is formed and, in extreme cases, determines it almost entirely.

Finally, time is needed to change the parent material into a soil profile. Some time is always required for the differentiation of soil horizons. A long time is normally required for the development of distinct horizons.

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

Parent Material

Parent materials in Gage County consist of two general types—consolidated and unconsolidated rocks. The consolidated (hard) rocks are the limestones, shales, and sandstones. A relatively small acreage of soils has formed from bedrock materials because these materials generally are deeply covered. Where such soils occur, however, they are relatively shallow because the solid rock is resistant to weathering. Some of the soils that formed in bedrock are Hedville, Kipson, Sogn, and Padonia. The principal unconsolidated (soft) rock parent materials are, in the order of their geologic age or deposition, glacial drift left by glaciers, glacial outwash deposited by water and later reworked by wind and water, silty loess deposited by wind, and alluvium deposited by streams (Condra and others, 1950).

Loess covers the high uplands and high terraces. Peorian and Loveland are the two dominant types of loess. Peorian loess is grayish to yellowish in color. It is younger than the brownish to reddish Loveland loess and is the most extensive of the soil-forming materials in the county. Few different types of soils, however, have formed in Peorian loess, because the loess is uniform in texture and in other characteristics. The differences are caused mainly by slope, or relief, which influences drainage, aeration, runoff, and erosion. Wymore, Otoe, and Butler soils formed in Peorian loess.

Loveland loess, which underlies the Peorian loess, is a source of parent material on hillsides. Soils that formed in Loveland loess are of minor importance because this material is not exposed in extensive areas. Deroin soils formed in Loveland loess.

Cortland, Malmo, and Morrill soils formed in reworked material from loess and till. This type of parent material is generally reddish to brownish in color and is scattered throughout the area that was covered by the Kansan glacier. This material contains stones, sand, and gravel.

Till of the Kansan age contributes to many kinds of soils and to a large acreage on hillsides in Gage County. It covers the bedrock in nearly all places. The till is generally grayish, yellowish, or brownish in color and contains silt, clay, sand, and gravel. It has been exposed to different degrees and ages of weathering. Pawnee, Burchard, and Steinauer soils formed in till.

Alluvium is a heterogeneous mixture of silt, clay, sand, gravel, and stones deposited by rivers and streams. It covers the flood plains, low terraces, and footslopes in Gage County and is still being deposited in many places. Soils that formed in alluvium generally are young. They vary according to the material that was the source of alluvium. Alluvium is the parent material of the Nodaway, Kennebec, Muscotah, Kezan, and Judson soils.

Climate

Climate is an active factor in the formation of soils. Its influence is both direct and indirect. In the past, cold temperatures activated glaciers that left till material, and dry and windy periods produced eolian or dust particles that accumulated as loess deposits. At present, the movement of water received as rain influences the shape of the landscape, and alternate freezing and thawing of the soil hasten disintegration of the parent material. Indirectly, climate affects the soils because it influences the amount and kind of vegetation and animal life living on them.

The continental climate of Gage County has seasonal variations. The winter is moderately long and cold, and temperatures are commonly below 0 degrees F. Spring is cool, and there is considerable precipitation. Summer is warm, and temperatures are commonly higher than 95 degrees F. Thunderstorms are common during summer and late in spring. The fall is mild, and there are occasional periods of rain. The average mean temperature is about 52 degrees F, and annual precipitation is about 32 inches.

Enough precipitation enters the soil and moves through it to move the carbonates and other soluble elements to a depth of at least 2 feet in most soils. Except for some of the steeper soils, most of the soils in Gage County are slightly acid to strongly acid in the surface layer. The soils are somewhat leached, but they retain a high percentage of basic mineral elements.

Plant and Animal Life

Grass, trees, animals, micro-organisms, earthworms, humans, and other kinds of plants and animals live on or in the soil and are active in the soil-forming processes. The kinds of plants and animals present are determined by environmental factors that include climate, parent material, age of the soil, relief, and drainage.

Before the soils were cultivated, the dominant vegetation in Gage County was mid and tall grasses. This kind of vegetation provides an abundance of organic matter that affects the physical and chemical properties of the soil and supplies the dark color to the surface layer. The fibrous roots of these grasses penetrate the soil, make it porous, and encourage development of the granular structures. The plant roots take up minerals in solution from the lower parts of the soil and eventually return them to the surface.

Micro-organisms, insects, earthworms, and burrowing rodents are beneficial to soil structure, making the soil more fertile and more productive. Micro-organisms convert organic remains into a stable humus from which living plants obtain nutrients. Earthworms, insects, and small burrowing rodents make openings and channels in the soil and aerate, loosen, and mix it. Their remains add to the content of organic matter. Humans have had an influence on the thickness and amount of organic matter in the surface layer. Tillage practices, such as plowing and chiseling, have removed the protective vegetative cover. Resulting water erosion has removed most of the dark surface layer of the soil. Malmo and Otoe soils are the product of human activities, which have removed the protective cover and allowed the soils to erode away.

Relief

Relief, or lay of the land, influences the formation of soil by affecting runoff, erosion, and drainage. Runoff is more rapid on steep and very steep slopes than on more gentle slopes. Less water penetrates the soil in areas that have rapid runoff, and absence of water reduces the amount of vegetation. Water can remove the soil almost as fast as it is formed. In Gage County, the very steep Steinauer soils have little soil profile development other than a slightly darkened, thin surface layer.

Soils in slight depressional areas, such as the Butler soils, collect run-in water and have characteristics that result from deep percolation of additional amounts of moisture. Clay colloids are leached to form a grayish subsurface layer and are then deposited as a dark, clayey subsoil. These claypan soils have very slow permeability.

Some of the nearly level soils on flood plains are somewhat poorly drained or poorly drained because they have a low runoff rate or a moderately high water table. Muscotah soils are clayey soils that have a low or very low runoff rate.

Time

The passage of time enables the factors of relief, climate, and plant and animal life to bring about the changes in parent material that result in the formation of soil. Generally, soils must be in place for some time to develop genetic profiles and thick horizons. If the parent material has been in place for only a short time, the soils are weakly developed because climate and vegetation have not been acting upon the soils for very long. Kennebec and Nodaway soils are weakly developed soils. These soils formed in recent alluvium deposited during the last few centuries. Some of these soils have formed during the last few years.

Wymore, Butler, and Otoe soils formed in Peorian loess and have been in place long enough to have developed well defined, genetically related horizons. Pawnee soils, which formed in glacial till, also have well defined, genetically related horizons. However,

because these soils have been developing for a shorter period of time than the soils that formed in Peorian loess, they are less deeply leached of carbonates. The longer the parent material is exposed to soil development, the more nearly the soil reaches a balance with its environment.

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Glossary

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

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

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

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

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

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

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

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

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	greater than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

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

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

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

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

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

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

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

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

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

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

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

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

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

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

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

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

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

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

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

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

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

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

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

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing

crops are alternated with strips of clean-tilled crops or summer fallow.

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

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

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

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

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

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

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

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

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

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

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

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

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

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

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

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

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

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

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

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

Firebreak. Area cleared of flammable material to stop

or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

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

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

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

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

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

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

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

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

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

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

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

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

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

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

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

O horizon.—An organic layer of fresh and decaying plant residue.

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

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

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

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

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

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

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

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

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

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

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

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

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

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

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

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

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

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

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

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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

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

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

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

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

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

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

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

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

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

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

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

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

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

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

and the thickness and arrangement of those horizons in the soil profile.

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

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

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

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	greater than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

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

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

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

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

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	greater than 20 inches

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

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

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

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

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

Playa. The generally dry and nearly level plain that occupies the lowest parts of closed depressional

areas. Temporary ponding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

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

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

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

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

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

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

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

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	greater than 9.0

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

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

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

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

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

Runoff. The precipitation discharged into stream channels from an area. The water that flows off

the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

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

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

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

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

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

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

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

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

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

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

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

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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

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

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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

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

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Strongly sloping	5 to 12 percent
Moderately steep	12 to 18 percent
Steep	18 to 30 percent
Very steep	30 percent and higher

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

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

Sodicity. The degree to which a soil is affected by

exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	greater than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

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

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

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

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

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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

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

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

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

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

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

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

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

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

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

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

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

when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

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

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

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

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

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

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

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

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

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

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

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Beatrice, Nebraska)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	34.0	13.5	23.8	60	-16	8	0.70	0.25	1.14	2	6.2
February	42.1	19.4	30.7	71	-10	36	0.76	0.37	1.22	1	7.3
March	52.9	29.4	41.2	82	1	167	2.25	0.89	3.57	4	4.5
April	66.7	41.1	53.9	88	20	432	2.70	1.47	3.79	5	0.7
May	76.3	51.6	64.0	93	31	741	4.20	2.74	5.52	7	0.0
June	85.6	61.4	73.5	101	44	999	4.00	2.37	5.46	6	0.0
July	90.9	66.6	78.8	104	51	1,204	3.57	1.55	5.29	5	0.0
August	88.9	64.1	76.5	102	49	1,129	3.56	1.59	5.24	5	0.0
September	79.8	54.8	67.3	98	33	821	3.66	1.41	5.54	5	0.0
October	69.4	43.5	56.5	90	23	517	2.56	0.76	4.02	4	0.2
November	52.5	31.0	41.8	74	8	149	1.40	0.37	2.23	2	1.7
December	38.8	19.1	28.9	67	-11	23	0.89	0.35	1.41	2	6.0
Yearly:											
Average	64.8	41.3	53.1	---	---	---	---	---	---	---	---
Extreme	108	-21	---	105	-16	---	---	---	---	---	---
Total	---	---	---	---	---	6,225	30.24	24.42	35.40	48	26.6

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

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Beatrice, Nebraska)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 11	Apr. 25	May 8
2 year in 10 later than--	Apr. 7	Apr. 20	May 3
5 year in 10 later than--	Mar. 28	Apr. 10	Apr. 23
First freezing temperature in fall:			
1 yr in 10 earlier than--	Oct. 22	Oct. 10	Sept. 26
2 yr in 10 earlier than--	Oct. 27	Oct. 15	Oct. 1
5 yr in 10 earlier than--	Nov. 5	Oct. 24	Oct. 11

Table 3.--Growing Season

(Recorded for the period 1961-90 at Beatrice, Nebraska)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	199	177	147
8 years in 10	206	184	155
5 years in 10	220	197	170
2 years in 10	234	210	185
1 year in 10	242	217	193

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

Map Symbol	Soil name	Acres	Percent
1849	Burchard clay loam, 2 to 6 percent slopes	548	*
1873	Burchard-Steinauer clay loams, 6 to 12 percent slopes, eroded	8,790	1.6
1879	Burchard-Steinauer clay loams, 12 to 18 percent slopes, eroded	4,058	0.7
1930	Butler silt loam, 0 to 1 percent slopes	1,677	0.3
2076	Chase silty clay loam, 0 to 1 percent slopes, rarely flooded	1,793	0.3
2201	Cortland-Malmo complex, 6 to 12 percent slopes	12,716	2.3
2418	Deroin silty clay loam, 2 to 5 percent slopes	900	0.2
2420	Deroin silty clay loam, 5 to 11 percent slopes	4,542	0.8
2695	Edalgo silty clay loam, 8 to 20 percent slopes	482	*
2832	Filley fine sandy loam, 6 to 12 percent slopes	162	*
2833	Filley fine sandy loam, 12 to 18 percent slopes	93	*
2863	Fluvaquents, silty, frequently flooded	148	*
3422	Hedville cobbly loam, 6 to 30 percent slopes	807	0.1
4106	Judson silt loam, 2 to 5 percent slopes	17,821	3.2
4210	Kennebec silt loam, 0 to 1 percent slopes, rarely flooded, cool	8,158	1.5
4232	Kennebec silt loam, 0 to 1 percent slopes, occasionally flooded, cool	9,592	1.7
4281	Kezan silt loam, 0 to 2 percent slopes, channeled, frequently flooded	1,114	0.2
4287	Kezan silt loam, 0 to 2 percent slopes, occasionally flooded	1,037	0.2
4298	Kipson-Sogn complex, 3 to 30 percent slopes	2,774	0.5
4300	Kipson-Sogn-Rock outcrop complex, 12 to 60 percent slopes	1,613	0.3
4428	Lancaster loam, 2 to 6 percent slopes	245	*
4429	Lancaster loam, 6 to 12 percent slopes	324	*
4858	Malmo clay loam, 2 to 6 percent slopes	6,083	1.1
4864	Malmo-Pawnee complex, 6 to 12 percent slopes	100,204	18.2
5397	Morrill loam, 12 to 18 percent slopes	1,749	0.3
5480	Muscotah silty clay loam, 0 to 1 percent slopes, occasionally flooded	3,300	0.6
5540	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	25,754	4.7
5541	Nodaway silt loam, 0 to 2 percent slopes, channeled, frequently flooded	25,773	4.7
5970	Otoe silty clay loam, 5 to 9 percent slopes	87,159	15.8
6005	Padonia silty clay loam, 6 to 12 percent slopes	412	*
7069	Steinauer clay loam, 12 to 30 percent slopes	4,909	0.9
7078	Steinauer clay loam, 30 to 60 percent slopes	873	0.2
8061	Wymore silty clay loam, 0 to 2 percent slopes	70,233	12.8
8063	Wymore silty clay loam, 2 to 5 percent slopes	135,705	24.7
8080	Wymore silty clay loam, terrace, 0 to 2 percent slopes	2,205	0.4
9900	Arents, earthen dam	535	*
9980	Pits, quarry	99	*
9985	Pits, sand and gravel	350	*
9995	Waste water, sewage lagoon	98	*
9998	Water	5,353	1.0
	Total	550,188	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
1849	Burchard clay loam, 2 to 6 percent slopes
1930	Butler silt loam, 0 to 1 percent slopes (where drained)
2076	Chase silty clay loam, 0 to 1 percent slopes, rarely flooded (where drained)
2418	Deroin silty clay loam, 2 to 5 percent slopes
4106	Judson silt loam, 2 to 5 percent slopes
4210	Kennebec silt loam, 0 to 1 percent slopes, rarely flooded, cool
4232	Kennebec silt loam, 0 to 1 percent slopes, occasionally flooded, cool
5480	Muscotah silty clay loam, 0 to 1 percent slopes, occasionally flooded (where drained)
5540	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded
8061	Wymore silty clay loam, 0 to 2 percent slopes
8063	Wymore silty clay loam, 2 to 5 percent slopes
8080	Wymore silty clay loam, terrace, 0 to 2 percent slopes

Table 6.--Land Capability and 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.)

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
1849:						
Burchard	3e	3.75	85	85	30	38
1873:						
Burchard	4e	3.50	80	80	29	40
Steinauer	4e	3.00	75	70	27	36
1879:						
Burchard	6e	2.50	65	70	25	30
Steinauer	6e	2.00	60	65	23	27
1930:						
Butler	2w	4.00	72	77	32	40
2076:						
Chase, rarely flooded	2w	4.50	95	100	40	43
2201:						
Cortland, severely eroded	4e	3.50	85	85	32	40
Malmo, severely eroded	4e	2.80	72	74	27	35
2418:						
Deroin, severely eroded	3e	3.75	85	85	35	40
2420:						
Deroin, severely eroded	4e	3.50	80	80	30	37
2695:						
Edalgo	6e	---	---	---	---	---
2832:						
Filley	4e	3.50	80	80	30	35
2833:						
Filley	6e	2.80	70	55	20	25
2863:						
Fluvaquents	8w	---	---	---	---	---
3422:						
Hedville	6s	---	---	---	---	---
4106:						
Judson	2e	4.80	105	85	40	45
4210:						
Kennebec, rarely flooded	1	4.50	110	100	44	47
4232:						
Kennebec, occasionally flooded	2w	4.50	100	90	40	45
4281:						
Kezan, channeled	6w	---	---	---	---	---

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
4287:						
Kezan, occasionally flooded	5w	---	---	---	---	---
4298:						
Kipson	6s	---	---	---	---	---
Sogn	6s	---	---	---	---	---
4300:						
Kipson	7s	---	---	---	---	---
Sogn	7s	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
4428:						
Lancaster	4e	3.20	60	60	25	35
4429:						
Lancaster	4e	3.20	49	60	25	33
4858:						
Malmo, severely eroded	3e	2.80	72	74	27	35
4864:						
Malmo, severely eroded	4e	2.80	72	74	27	35
Pawnee	4e	3.50	80	80	30	38
5397:						
Morrill	6e	3.00	75	55	25	30
5480:						
Muscotah, occasionally flooded	2w	4.50	95	100	40	41
5540:						
Nodaway, occasionally flooded	2w	4.50	110	100	38	47
5541:						
Nodaway, channeled	6w	---	---	---	---	---
5970:						
Otoe, severely eroded	4e	3.50	83	83	33	40
6005:						
Padonia	4e	3.00	70	65	25	32
7069:						
Steinauer	6e	2.00	65	65	---	25
7078:						
Steinauer	7e	---	---	---	---	---
8061:						
Wymore	2s	3.50	85	85	35	40
8063:						
Wymore	3e	3.50	85	85	35	40
8080:						
Wymore	2s	3.50	85	85	35	40

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Grain sorghum	Soybeans	Winter wheat
		Tons	Bu	Bu	Bu	Bu
9900: Arents, earthen dam	8	---	---	---	---	---
9980: Pits, quarry.						
9985: Pits, sand and gravel	8s	---	---	---	---	---
9995: Waste water, sewage lagoon.						
9998: Water.						

Table 7.--General Crop Production Index

(See text for an explanation of the ratings in this table.)

Map symbol	Soil name	Crop index
1849	Burchard clay loam, 2 to 6 percent slopes	68
1873	Burchard-Steinauer clay loams, 6 to 12 percent slopes, eroded	56
1879	Burchard-Steinauer clay loams, 12 to 18 percent slopes, eroded	49
1930	Butler silt loam, 0 to 1 percent slopes	66
2076	Chase silty clay loam, 0 to 1 percent slopes, rarely flooded	74
2201	Cortland-Malmo complex, 6 to 12 percent slopes	56
2418	Deroin silty clay loam, 2 to 5 percent slopes	75
2420	Deroin silty clay loam, 5 to 11 percent slopes	69
2695	Edalgo silty clay loam, 8 to 20 percent slopes	30
2832	Filley fine sandy loam, 6 to 12 percent slopes	48
2833	Filley fine sandy loam, 12 to 18 percent slopes	42
2863	Fluvaquents, silty, frequently flooded	7
3422	Hedville cobbly loam, 6 to 30 percent slopes	6
4106	Judson silt loam, 2 to 5 percent slopes	79
4210	Kennebec silt loam, 0 to 1 percent slopes, rarely flooded, cool	76
4232	Kennebec silt loam, 0 to 1 percent slopes, occasionally flooded, cool	73
4281	Kezan silt loam, 0 to 2 percent slopes, channeled, frequently flooded	47
4287	Kezan silt loam, 0 to 2 percent slopes, occasionally flooded	61
4298	Kipson-Sogn complex, 3 to 30 percent slopes	4
4300	Kipson-Sogn-Rock outcrop complex, 12 to 60 percent slopes	1
4428	Lancaster loam, 2 to 6 percent slopes	50
4429	Lancaster loam, 6 to 12 percent slopes	43
4858	Malmo clay loam, 2 to 6 percent slopes	59
4864	Malmo-Pawnee complex, 6 to 12 percent slopes	54
5397	Morrill loam, 12 to 18 percent slopes	48
5480	Muscotah silty clay loam, 0 to 1 percent slopes, occasionally flooded	69
5540	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	73
5541	Nodaway silt loam, 0 to 2 percent slopes, channeled, frequently flooded	60
5970	Otoe silty clay loam, 5 to 9 percent slopes	64
6005	Padonia silty clay loam, 6 to 12 percent slopes	38
7069	Steinauer clay loam, 12 to 30 percent slopes	34
7078	Steinauer clay loam, 30 to 60 percent slopes	7
8061	Wymore silty clay loam, 0 to 2 percent slopes	70
8063	Wymore silty clay loam, 2 to 5 percent slopes	68
8080	Wymore silty clay loam, terrace, 0 to 2 percent slopes	70
9900	Arents, earthen dam	0
9980	Pits, quarry	0
9985	Pits, sand and gravel	0
9995	Waste water, sewage lagoon	0
9998	Water	0

Table 8.--Rangeland Productivity and Characteristic Plant Communities

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

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
1849:				
Burchard	Silty; Veg. Zone 4	4,750	4,000	3,000
1873:				
Burchard	Silty; Veg. Zone 4	4,750	4,000	3,000
Steinauer	Limy Upland; Veg. Zone 4	4,000	3,000	2,500
1879:				
Burchard	Silty; Veg. Zone 4	4,750	4,000	3,000
Steinauer	Limy Upland; Veg. Zone 4	4,000	3,000	2,500
1930:				
Butler	Clayey; Veg. Zone 4	4,500	3,750	2,750
2076:				
Chase, rarely flooded	Clayey Overflow; Veg. Zone 4	4,000	3,000	2,500
2201:				
Cortland, severely eroded	Silty; Veg. Zone 4	4,750	4,000	3,000
Malmo, severely eroded	Clayey; Veg. Zone 4	4,500	3,750	2,750
2418:				
Deroin, severely eroded	Silty; Veg. Zone 4	4,750	4,000	3,000
2420:				
Deroin, severely eroded	Silty; Veg. Zone 4	4,750	4,000	3,000
2695:				
Edalgo	Clayey; Veg. Zone 4	4,500	3,750	2,750
2832:				
Filley	Sandy; Veg. Zone 4	4,000	3,300	2,750
2833:				
Filley	Sandy; Veg. Zone 4	4,000	3,300	2,750
3422:				
Hedville	Shallow Sandy; Veg. Zone 4	2,500	2,000	1,500
4106:				
Judson	Silty; Veg. Zone 4	4,750	4,000	3,000
4210:				
Kennebec, rarely flooded	Silty Overflow; Veg. Zone 4	5,000	4,000	3,000
4232:				
Kennebec, occasionally flooded	Silty Overflow; Veg. Zone 4	5,000	4,000	3,000
4281:				
Kezan, channeled	Wet Subirrigated; Veg. Zone 4	6,250	5,500	5,250
4287:				
Kezan, occasionally flooded	Wet Subirrigated; Veg. Zone 4	6,250	5,500	5,250

Table 8.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
4298:				
Kipson	Shallow Limy; Veg. Zone 4	4,000	3,000	2,500
Sogn	Shallow Limy; Veg. Zone 4	4,000	3,000	2,500
4300:				
Kipson	Shallow Limy; Veg. Zone 4	3,500	2,500	2,000
Sogn	Shallow Limy; Veg. Zone 4	3,500	2,500	2,000
Rock outcrop	No Site; Veg. Zone 4	0	0	0
4428:				
Lancaster	Silty; Veg. Zone 4	4,750	4,000	3,000
4429:				
Lancaster	Silty; Veg. Zone 4	4,750	4,000	3,000
4858:				
Malmo, severely eroded	Clayey; Veg. Zone 4	4,500	3,750	2,750
4864:				
Malmo, severely eroded	Clayey; Veg. Zone 4	4,500	3,750	2,750
Pawnee	Clayey; Veg. Zone 4	4,500	3,750	2,750
5397:				
Morrill	Silty; Veg. Zone 4	4,750	4,000	3,000
5480:				
Muscotah, occasionally flooded	Clayey Overflow; Veg. Zone 4	4,000	3,000	2,500
5540:				
Nodaway, occasionally flooded	Silty Overflow; Veg. Zone 4	4,000	3,300	2,750
5541:				
Nodaway, channeled	Silty Overflow; Veg. Zone 4	4,000	3,300	2,750
5970:				
Otoe, severely eroded	Clayey; Veg. Zone 4	4,500	3,750	2,750
6005:				
Padonia	Clayey; Veg. Zone 4	4,500	3,750	2,750
7069:				
Steinauer	Limy Upland; Veg. Zone 4	4,000	3,000	2,500
7078:				
Steinauer	Limy Upland; Veg. Zone 4	3,500	2,500	2,000
8061:				
Wymore	Clayey; Veg. Zone 4	4,500	3,750	2,750
8063:				
Wymore	Clayey; Veg. Zone 4	4,500	3,750	2,750
8080:				
Wymore	Clayey; Veg. Zone 4	4,500	3,750	2,750

Table 9.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1849:					
Burchard	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
1873:					
Burchard	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
Steinauer	American plum, fragrant sumac, silver buffaloberry, skunkbush sumac	---	Black locust, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine	Siberian elm	---
1879:					
Burchard	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
Steinauer	American plum, fragrant sumac, silver buffaloberry, skunkbush sumac	---	Black locust, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine	Siberian elm	---
1930:					
Butler	American plum, cotoneaster, forsythia, fragrant sumac, gray dogwood	Amur honeysuckle, amur maple, autumn olive, common chokecherry, skunkbush sumac	Blue spruce, boxelder, eastern redcedar, red mulberry, Russian olive	American sycamore, Austrian pine, black walnut, green ash, honeylocust, Norway maple, pin oak, Scotch pine	Eastern cottonwood, Siberian elm, silver maple
2076:					
Chase	American plum, cotoneaster, forsythia, fragrant sumac, gray dogwood	Amur honeysuckle, amur maple, autumn olive, common chokecherry, skunkbush sumac	Blue spruce, boxelder, eastern redcedar, red mulberry, Russian olive	American sycamore, Austrian pine, black walnut, green ash, honeylocust, Norway maple, pin oak, Scotch pine	Eastern cottonwood, Siberian elm, silver maple

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2201:					
Cortland	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
Malmo	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive	Siberian elm	---
2418:					
Deroin	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
2420:					
Deroin	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
2695:					
Edalgo	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
2832:					
Filley	American plum, forsythia, Peking cotoneaster	Amur honeysuckle, autumn olive, cotoneaster, fragrant sumac, hazelnut, skunkbush sumac	Blue spruce, bur oak, eastern redcedar, red mulberry, Russian olive	American sycamore, Austrian pine, black locust, green ash, honeylocust, ponderosa pine, Scotch pine, Siberian elm	---
2833:					
Filley	American plum, forsythia, Peking cotoneaster	Amur honeysuckle, autumn olive, cotoneaster, fragrant sumac, hazelnut, skunkbush sumac	Blue spruce, bur oak, eastern redcedar, red mulberry, Russian olive	American sycamore, Austrian pine, black locust, green ash, honeylocust, ponderosa pine, Scotch pine, Siberian elm	---

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
4106: Judson	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
4210: Kennebec	Cotoneaster, forsythia, fragrant sumac, gray dogwood	American plum, amur honeysuckle, autumn olive, common chokecherry	Boxelder, eastern redcedar, red mulberry, Russian olive	Austrian pine, black walnut, blue spruce, green ash, honeylocust, Norway maple, pin oak, Scotch pine	American sycamore, eastern cottonwood, Siberian elm, silver maple
4232: Kennebec	Cotoneaster, forsythia, fragrant sumac, gray dogwood	American plum, amur honeysuckle, autumn olive, common chokecherry	Boxelder, eastern redcedar, red mulberry, Russian olive	Austrian pine, black walnut, blue spruce, green ash, honeylocust, Norway maple, pin oak, Scotch pine	American sycamore, eastern cottonwood, Siberian elm, silver maple
4428: Lancaster	Common lilac, Siberian peashrub	Rocky Mountain juniper	Austrian pine, bur oak, eastern redcedar, green ash, Russian mulberry, Russian olive, honeylocust	Siberian elm	---
4429: Lancaster	Common lilac, Siberian peashrub	Rocky Mountain juniper	Austrian pine, bur oak, eastern redcedar, green ash, Russian mulberry, Russian olive, honeylocust	Siberian elm	---
4858: Malmo	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
4864: Malmo	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
4864: Pawnee	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
5397: Morrill	Forsythia, gray dogwood, hazelnut, Peking cotoneaster, redosier dogwood	American plum, amur honeysuckle, autumn olive, fragrant sumac, silver buffaloberry, skunkbush sumac	Black walnut, blue spruce, bur oak, eastern redcedar, green ash, Russian olive	American basswood, Austrian pine, black locust, honeylocust, ponderosa pine, Scotch pine, silver maple	---
5480: Muscotah	American plum, cotoneaster, forsythia, fragrant sumac, gray dogwood	Amur honeysuckle, amur maple, autumn olive, common chokecherry, skunkbush sumac	Blue spruce, boxelder, eastern redcedar, red mulberry, Russian olive	American sycamore, Austrian pine, black walnut, green ash, honeylocust, Norway maple, pin oak, Scotch pine	Eastern cottonwood, Siberian elm, silver maple
5540: Nodaway	Cotoneaster, forsythia, fragrant sumac, gray dogwood	American plum, amur honeysuckle, autumn olive, common chokecherry	Boxelder, eastern redcedar, red mulberry, Russian olive	Austrian pine, black walnut, blue spruce, green ash, honeylocust, Norway maple, pin oak, Scotch pine	American sycamore, eastern cottonwood, Siberian elm, silver maple
5541: Nodaway.					
5970: Otoe	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
6005: Padonia	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---

Table 9.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
8061:					
Wymore	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
8063:					
Wymore	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---
8080:					
Wymore	Hazelnut, Peking cotoneaster	American plum, amur honeysuckle, autumn olive, fragrant sumac, skunkbush sumac	Austrian pine, black locust, blue spruce, bur oak, eastern redcedar, green ash, honeylocust, ponderosa pine, Russian olive, Scotch pine	Siberian elm	---

Table 10a.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	0.48
						Restricted permeability	0.15
1873:							
Burchard	50	Somewhat limited:		Somewhat limited:		Very limited:	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.15
Steinauer	35	Somewhat limited:		Somewhat limited:		Very limited:	
		Restricted permeability	0.15	Restricted permeability	0.15	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.15
1879:							
Burchard	45	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
Steinauer	40	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.96	Slope	0.96	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
1930:							
Butler	92	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
2076:							
Chase, rarely flooded	85	Very limited:		Somewhat limited:		Somewhat limited:	
		Flooding	1.00	Restricted permeability	0.94	Restricted permeability	0.94
		Restricted permeability	0.94				
2201:							
Cortland, severely eroded	55	Somewhat limited:		Somewhat limited:		Very limited:	
		Restricted permeability	0.69	Restricted permeability	0.69	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.69
Malmo, severely eroded	25	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44

Table 10a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2418:							
Deroin, severely eroded	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
						Slope	0.21
2420:							
Deroin, severely eroded	90	Somewhat limited:		Somewhat limited:		Very limited:	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	1.00
						Restricted permeability	0.21
2695:							
Edalgo	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.96	Slope	0.96	Slope	1.00
		Restricted permeability	0.45	Restricted permeability	0.45	Depth to bedrock	0.65
						Restricted permeability	0.45
2832:							
Filley	95	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.04	Slope	0.04	Slope	1.00
2833:							
Filley	90	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
2863:							
Fluvaquents	95	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Ponding	1.00	Too clayey	1.00	Ponding	1.00
		Too clayey	1.00	Restricted permeability	0.94	Too clayey	1.00
		Restricted permeability	0.94	Flooding	0.40	Restricted permeability	0.94
3422:							
Hedville	80	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
						Content of large stones	0.68
4106:							
Judson	90	Not limited		Not limited		Somewhat limited:	
						Slope	0.21
4210:							
Kennebec, rarely flooded	85	Very limited:		Not limited		Not limited	
		Flooding	1.00				
4232:							
Kennebec, occasionally flooded	90	Very limited:		Not limited		Somewhat limited:	
		Flooding	1.00			Flooding	0.60

Table 10a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4281:							
Kezan, channeled	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Flooding	0.40	Depth to saturated zone	1.00
4287:							
Kezan, occasionally flooded	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Flooding	0.60
4298:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
						Content of large stones	0.20
						Gravel content	0.08
Sogn	45	Very limited:		Very limited:		Very limited:	
		Too stony	1.00	Too stony	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Too stony	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
						Content of large stones	0.00
4300:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Content of large stones	0.20
						Gravel content	0.08
Sogn	35	Very limited:		Very limited:		Very limited:	
		Too stony	1.00	Too stony	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too stony	1.00
						Content of large stones	0.00
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Not limited		Not limited		Somewhat limited:	
						Slope	0.77
						Depth to bedrock	0.20
4429:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.04	Slope	0.04	Slope	1.00
						Depth to bedrock	0.20

Table 10a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4858:							
Malmo, severely eroded	85	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	0.48
						Depth to saturated zone	0.44
4864:							
Malmo, severely eroded	60	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44
Pawnee	30	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44
5397:							
Morrill	80	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.26	Restricted permeability	0.26	Restricted permeability	0.26
						Gravel content	0.06
5480:							
Muscotah, occasionally flooded	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Flooding	1.00	Restricted permeability	0.94	Restricted permeability	0.94
		Restricted permeability	0.94	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.08			Depth to saturated zone	0.08
5540:							
Nodaway, occasionally flooded	90	Very limited:		Not limited		Somewhat limited:	
		Flooding	1.00			Flooding	0.60
5541:							
Nodaway, channeled	85	Very limited:		Somewhat limited:		Very limited:	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
5970:							
Otoe, severely eroded	85	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	1.00
						Depth to saturated zone	0.44

Table 10a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6005:							
Padonia	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Restricted permeability	0.94	Restricted permeability	0.94	Slope	1.00
		Slope	0.04	Slope	0.04	Restricted permeability	0.94
						Depth to bedrock	0.42
7069:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
7078:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.15	Restricted permeability	0.15	Restricted permeability	0.15
8061:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Depth to saturated zone	0.44
8063:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Slope	0.48
						Depth to saturated zone	0.44
8080:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.19	Depth to saturated zone	0.44
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9980:							
Pits, quarry	100	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
9985:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
9995:							
Waste water, sewage lagoon	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 10b.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Not limited		Not limited		Not limited	
1873:							
Burchard	50	Not limited		Not limited		Somewhat limited:	
						Slope	0.04
Steinauer	35	Not limited		Not limited		Somewhat limited:	
						Slope	0.04
1879:							
Burchard	45	Not limited		Not limited		Very limited:	
						Slope	1.00
Steinauer	40	Not limited		Not limited		Somewhat limited:	
						Slope	0.96
1930:							
Butler	92	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
2076:							
Chase, rarely flooded	85	Not limited		Not limited		Not limited	
2201:							
Cortland, severely eroded	55	Not limited		Not limited		Somewhat limited:	
						Slope	0.04
Malmo, severely eroded	25	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
						Slope	0.04
2418:							
Deroin, severely eroded	85	Not limited		Not limited		Not limited	
2420:							
Deroin, severely eroded	90	Not limited		Not limited		Not limited	
2695:							
Edalgo	80	Not limited		Not limited		Somewhat limited:	
						Slope	0.96
						Depth to bedrock	0.65
2832:							
Filley	95	Not limited		Not limited		Somewhat limited:	
						Slope	0.04

Table 10b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2833:							
Filley	90	Not limited		Not limited		Very limited:	
						Slope	1.00
2863:							
Fluvaquents	95	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Flooding	1.00
		Too clayey	1.00	Too clayey	1.00	Depth to saturated zone	1.00
		Flooding	0.40	Flooding	0.40	Too clayey	1.00
3422:							
Hedville	80	Somewhat limited:		Not limited		Very limited:	
		Slope	0.18			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
						Content of large stones	0.68
4106:							
Judson	90	Not limited		Not limited		Not limited	
4210:							
Kennebec, rarely flooded	85	Not limited		Not limited		Not limited	
4232:							
Kennebec, occasionally flooded	90	Not limited		Not limited		Somewhat limited:	
						Flooding	0.60
4281:							
Kezan, channeled	85	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
4287:							
Kezan, occasionally flooded	85	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
						Flooding	0.60
4298:							
Kipson	50	Not limited		Not limited		Very limited:	
						Depth to bedrock	1.00
						Slope	1.00
						Carbonate content	1.00
						Droughty	0.35
						Content of large stones	0.20
Sogn	45	Very limited:		Very limited:		Very limited:	
		Too stony	1.00	Too stony	1.00	Droughty	1.00
						Depth to bedrock	1.00
						Slope	1.00
						Content of large stones	0.00

Table 10b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4300:							
Kipson	50	Very limited:		Somewhat limited:		Very limited:	
		Slope	1.00	Slope	0.22	Depth to bedrock	1.00
						Slope	1.00
						Carbonate content	1.00
						Droughty	0.35
						Content of large stones	0.20
Sogn	35	Very limited:		Very limited:		Very limited:	
		Too stony	1.00	Too stony	1.00	Droughty	1.00
		Slope	1.00	Slope	0.22	Depth to bedrock	1.00
						Slope	1.00
						Content of large stones	0.00
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Not limited		Not limited		Somewhat limited:	
						Depth to bedrock	0.20
4429:							
Lancaster	80	Not limited		Not limited		Somewhat limited:	
						Depth to bedrock	0.20
						Slope	0.04
4858:							
Malmo, severely eroded	85	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
4864:							
Malmo, severely eroded	60	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
						Slope	0.04
Pawnee	30	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
						Slope	0.04
5397:							
Morrill	80	Not limited		Not limited		Very limited:	
						Slope	1.00
5480:							
Muscotah, occasionally flooded	90	Not limited		Not limited		Somewhat limited:	
						Flooding	0.60
						Depth to saturated zone	0.03
5540:							
Nodaway, occasionally flooded	90	Not limited		Not limited		Somewhat limited:	
						Flooding	0.60

Table 10b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5541:							
Nodaway, channeled--	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
5970:							
Otoe, severely eroded----------	85	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
6005:							
Padonia----------	85	Not limited		Not limited		Somewhat limited:	
						Depth to bedrock	0.42
						Slope	0.04
7069:							
Steinauer----------	85	Somewhat limited:		Not limited		Very limited:	
		Slope	0.50			Slope	1.00
7078:							
Steinauer----------	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
8061:							
Wymore----------	90	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
8063:							
Wymore----------	90	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
8080:							
Wymore----------	90	Not limited		Not limited		Somewhat limited:	
						Depth to saturated zone	0.19
9900:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9980:							
Pits, quarry--------	100	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Water erosion	1.00	Slope	1.00
		Water erosion	1.00	Slope	0.22	Droughty	1.00
9985:							
Pits, sand and gravel----------	100	Not rated		Not rated		Not rated	
9995:							
Waste water, sewage lagoon----------	100	Not rated		Not rated		Not rated	
9998:							
Water----------	100	Not rated		Not rated		Not rated	

Table 11.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

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
1849:												
Burchard	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
1873:												
Burchard	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Steinauer	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
1879:												
Burchard	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Steinauer	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
1930:												
Butler	Good	Good	Good	---	Good	Good	Fair	Fair	Good	---	Fair	Good
2076:												
Chase	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair	---
2201:												
Cortland	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
Malmo	Fair	Good	Good	Good	Good	Fair	Very poor	Very poor	Good	Good	Very poor	Fair
2418:												
Deroin	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
2420:												
Deroin	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
2695:												
Edalgo	Fair	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
2832:												
Filley	Poor	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Fair	Very poor	---
2833:												
Filley	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
2863:												
Fluvaquents	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good	Very poor
3422:												
Hedville	Very poor	Poor	Poor	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
4106:												
Judson	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---

Table 11.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
4210:												
Kennebec	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
4232:												
Kennebec	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
4281:												
Kezan	Very poor	Fair	Fair	Poor	Poor	Fair	Good	Good	Fair	Fair	Good	Fair
4287:												
Kezan	Very poor	Fair	Fair	Poor	Poor	Fair	Good	Good	Fair	Fair	Good	Fair
4298:												
Kipson	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
Sogn	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	---	Very poor	Poor
4300:												
Kipson	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
Sogn	Very poor	Very poor	Poor	---	---	Poor	Very poor	Very poor	Very poor	---	Very poor	Poor
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
4428:												
Lancaster	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
4429:												
Lancaster	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
4858:												
Malmo	Fair	Good	Good	Good	Good	Fair	Very poor	Very poor	Good	Good	Very poor	Fair
4864:												
Malmo	Fair	Good	Good	Good	Good	Fair	Very poor	Very poor	Good	Good	Very poor	Fair
Pawnee	Fair	Good	Good	---	Fair	Fair	Very poor	Very poor	Good	Good	Very poor	Fair
5397:												
Morrill	Fair	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
5480:												
Muscotah	Fair	Good	Good	Poor	Good	Good	Fair	Fair	Good	Good	Fair	---
5540:												
Nodaway	Good	Good	Good	Good	Fair	---	Fair	Poor	Fair	Good	Fair	---
5541:												
Nodaway	Poor	Fair	Fair	Fair	Poor	---	Fair	Fair	Fair	Fair	Poor	---

Table 11.--Wildlife Habitat--Continued

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
5970:												
Otoe	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
6005:												
Padonia	Fair	Good	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor	Fair
7069:												
Steinauer	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
7078:												
Steinauer	Very poor	Poor	Good	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor	Good
8061:												
Wymore	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
8063:												
Wymore	Fair	Good	Fair	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
8080:												
Wymore	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair

Table 12a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
1873:							
Burchard	50	Somewhat limited:		Somewhat limited:		Very limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.50
Steinauer	35	Somewhat limited:		Somewhat limited:		Very limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.50
1879:							
Burchard	45	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Steinauer	40	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.96	Slope	0.96	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
1930:							
Butler	92	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	0.50	Depth to saturated zone	1.00
2076:							
Chase	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.95	Shrink-swell	1.00
				Shrink-swell	0.50		
2201:							
Cortland	55	Somewhat limited:		Somewhat limited:		Very limited:	
		Shrink-swell	0.50	Slope	0.04	Slope	1.00
		Slope	0.04			Shrink-swell	0.50
Malmo	25	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44
2418:							
Deroin	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
2420:							
Deroin	90	Somewhat limited:		Somewhat limited:		Very limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
						Shrink-swell	0.50

Table 12a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2695:							
Edalgo	80	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.96	Slope	0.96	Slope	1.00
				Depth to soft bedrock	0.64		
2832:							
Filley	95	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.04	Slope	0.04	Slope	1.00
2833:							
Filley	90	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
2863:							
Fluvaquents	95	Very limited:		Very limited:		Very limited:	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
3422:							
Hedville	80	Very limited:		Very limited:		Very limited:	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
4106:							
Judson	90	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4210:							
Kennebec	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
4232:							
Kennebec	90	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
4281:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
4287:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00

Table 12a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4298:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Sogn	45	Very limited:		Very limited:		Very limited:	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4300:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Sogn	35	Very limited:		Very limited:		Very limited:	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Not limited		Somewhat limited:		Somewhat limited:	
				Depth to soft bedrock	0.20	Slope	0.12
4429:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.04	Depth to soft bedrock	0.20	Slope	1.00
				Slope	0.04		
4858:							
Malmo	85	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Depth to saturated zone	0.44
4864:							
Malmo	60	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44
Pawnee	30	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	1.00	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.44
5397:							
Morrill	80	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50			Shrink-swell	0.50

Table 12a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5480:							
Muscotah	90	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.08	Depth to saturated zone	1.00	Depth to saturated zone	0.08
5540:							
Nodaway	90	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
5541:							
Nodaway	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
5970:							
Otoe	85	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Slope	0.86
						Depth to saturated zone	0.44
6005:							
Padonia	85	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.04	Depth to soft bedrock	0.42	Slope	1.00
				Slope	0.04		
7069:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
7078:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
8061:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Depth to saturated zone	0.44
8063:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Depth to saturated zone	0.44
8080:							
Wymore	90	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.44	Shrink-swell	0.50	Depth to saturated zone	0.44

Table 12a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9900: Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9980: Pits, quarry--------	100	Very limited: Slope	1.00	Very limited: Slope	1.00	Very limited: Slope	1.00
9985: Pits, sand and gravel----------	100	Not rated		Not rated		Not rated	
9995: Waste water, sewage lagoon----------	100	Not rated		Not rated		Not rated	
9998: Water----------	100	Not rated		Not rated		Not rated	

Table 12b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Very limited:		Somewhat limited:		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
1873:							
Burchard	50	Very limited:		Somewhat limited:		Somewhat limited:	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.04
		Shrink-swell	0.50	Slope	0.04		
		Frost action	0.50				
		Slope	0.04				
Steinauer	35	Very limited:		Somewhat limited:		Somewhat limited:	
		Low strength	1.00	Cutbanks cave	0.10	Slope	0.04
		Shrink-swell	0.50	Slope	0.04		
		Frost action	0.50				
		Slope	0.04				
1879:							
Burchard	45	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Steinauer	40	Very limited:		Somewhat limited:		Somewhat limited:	
		Low strength	1.00	Slope	0.96	Slope	0.96
		Slope	0.96	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
1930:							
Butler	92	Very limited:		Very limited:		Very limited:	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00				
		Low strength	1.00	Too clayey	0.50		
		Depth to saturated zone	1.00	Cutbanks cave	0.10		
2076:							
Chase	85	Very limited:		Somewhat limited:		Not limited	
		Frost action	1.00	Depth to saturated zone	0.95		
		Low strength	1.00				
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Flooding	0.40	Too clayey	0.02		
2201:							
Cortland	55	Somewhat limited:		Very limited:		Somewhat limited:	
		Shrink-swell	0.50	Cutbanks cave	1.00	Slope	0.04
		Frost action	0.50	Slope	0.04		
		Slope	0.04				

Table 12b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2201:							
Malmo	25	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Depth to saturated zone	1.00	Slope	0.04
		Shrink-swell	1.00	Too clayey	0.18		
		Depth to saturated zone	0.19	Slope	0.04		
		Slope	0.04				
2418:							
Deroin	85	Very limited:		Somewhat limited:		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
2420:							
Deroin	90	Very limited:		Somewhat limited:		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
2695:							
Edalgo	80	Very limited:		Somewhat limited:		Somewhat limited:	
		Low strength	1.00	Slope	0.96	Slope	0.96
		Shrink-swell	1.00	Depth to soft bedrock	0.64	Depth to bedrock	0.65
		Slope	0.96	Too clayey	0.50		
		Frost action	0.50	Cutbanks cave	0.10		
2832:							
Filley	95	Somewhat limited:		Very limited:		Somewhat limited:	
		Frost action	0.50	Cutbanks cave	1.00	Slope	0.04
		Slope	0.04	Slope	0.04		
2833:							
Filley	90	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
		Frost action	0.50	Slope	1.00		
2863:							
Fluvaquents	95	Very limited:		Very limited:		Very limited:	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Frost action	0.50	Cutbanks cave	0.10	Too clayey	1.00
				Too clayey	0.02		
3422:							
Hedville	80	Very limited:		Very limited:		Very limited:	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Droughty	1.00
		Frost action	0.50	Cutbanks cave	0.10	Slope	1.00
						Content of large stones	0.68
4106:							
Judson	90	Very limited:		Somewhat limited:		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Table 12b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4210:							
Kennebec	85	Very limited:		Somewhat limited:		Not limited	
		Frost action	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Flooding	0.40				
4232:							
Kennebec	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
4281:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	1.00				
4287:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	1.00				
4298:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.50			Droughty	0.35
		Frost action	0.50			Content of large stones	0.20
Sogn	45	Very limited:		Very limited:		Very limited:	
		Low strength	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Depth to hard bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00	Cutbanks cave	0.10	Slope	1.00
		Shrink-swell	0.50			Content of large stones	0.00
		Frost action	0.50				
4300:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10	Carbonate content	1.00
		Shrink-swell	0.50			Droughty	0.35
		Frost action	0.50			Content of large stones	0.20

Table 12b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4300:							
Sogn	35	Very limited:		Very limited:		Very limited:	
		Low strength	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Depth to hard bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00	Cutbanks cave	0.10	Slope	1.00
		Shrink-swell	0.50			Content of large stones	0.00
		Frost action	0.50				
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Frost action	0.50	Depth to soft bedrock	0.20	Depth to bedrock	0.20
				Cutbanks cave	0.10		
4429:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Frost action	0.50	Depth to soft bedrock	0.20	Depth to bedrock	0.20
		Slope	0.04	Cutbanks cave	0.10	Slope	0.04
				Slope	0.04		
4858:							
Malmo	85	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Depth to saturated zone	1.00		
		Shrink-swell	1.00	Too clayey	0.18		
		Depth to saturated zone	0.19				
4864:							
Malmo	60	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Depth to saturated zone	1.00	Slope	0.04
		Shrink-swell	1.00	Too clayey	0.18		
		Depth to saturated zone	0.19	Slope	0.04		
		Slope	0.04				
Pawnee	30	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.18	Slope	0.04
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19	Slope	0.04		
		Slope	0.04				
5397:							
Morrill	80	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
		Shrink-swell	0.50	Slope	1.00		
		Frost action	0.50				

Table 12b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5480:							
Muscotah	90	Very limited:		Very limited:		Somewhat limited:	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Low strength	1.00			Depth to saturated zone	0.03
		Shrink-swell	1.00	Flooding	0.60		
		Frost action	0.50	Cutbanks cave	0.10		
		Depth to saturated zone	0.03	Too clayey	0.02		
5540:							
Nodaway	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	0.61	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
5541:							
Nodaway	85	Very limited:		Somewhat limited:		Very limited:	
		Frost action	1.00	Flooding	0.80	Flooding	1.00
		Flooding	1.00	Depth to saturated zone	0.61		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
5970:							
Otoe	85	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.12		
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
6005:							
Padonia	85	Very limited:		Somewhat limited:		Somewhat limited:	
		Low strength	1.00	Depth to soft bedrock	0.42	Depth to bedrock	0.42
		Shrink-swell	1.00			Slope	0.04
		Frost action	0.50	Cutbanks cave	0.10		
		Slope	0.04	Slope	0.04		
				Too clayey	0.03		
7069:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
7078:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
8061:							
Wymore	90	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.32		
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				

Table 12b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8063:							
Wymore	90	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.32		
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
8080:							
Wymore	90	Very limited:		Very limited:		Somewhat limited:	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Low strength	1.00	Too clayey	0.32		
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.19				
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9980:							
Pits, quarry	100	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
9985:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
9995:							
Waste water, sewage lagoon	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 13a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1849:					
Burchard	85	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Slope	0.33
1873:					
Burchard	50	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.04		
Steinauer	35	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.04		
1879:					
Burchard	45	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
Steinauer	40	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.96		
1930:					
Butler	92	Very limited:		Not limited	
		Restricted permeability	1.00		
		Depth to saturated zone	1.00		
2076:					
Chase	85	Very limited:		Very limited:	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Flooding	0.40
		Flooding	0.40		
2201:					
Cortland	55	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
				Seepage	1.00
		Filtering capacity	1.00		
		Slope	0.04		
Malmo	25	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
		Slope	0.04		

Table 13a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2418:					
Deroin	85	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Slope	0.09
2420:					
Deroin	90	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
2695:					
Edalgo	80	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.96		
2832:					
Filley	95	Very limited:		Very limited:	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.04	Slope	1.00
2833:					
Filley	90	Very limited:		Very limited:	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
2863:					
Fluvaquents	95	Very limited:		Very limited:	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Seepage	1.00
3422:					
Hedville	80	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
4106:					
Judson	90	Somewhat limited:		Somewhat limited:	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.09
4210:					
Kennebec	85	Very limited:		Somewhat limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Restricted permeability	0.50	Seepage	0.50
		Flooding	0.40	Flooding	0.40

Table 13a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4232:					
Kennebec	90	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Restricted permeability	0.50	Seepage	0.50
4281:					
Kezan	85	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.50	Seepage	0.50
4287:					
Kezan	85	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.50	Seepage	0.50
4298:					
Kipson	50	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
Sogn	45	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
4300:					
Kipson	50	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.50
Sogn	35	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
Rock outcrop	15	Not rated		Not rated	
4428:					
Lancaster	80	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.46	Slope	0.67
				Seepage	0.53

Table 13a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4429:					
Lancaster	80	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.46	Slope	1.00
		Slope	0.04	Seepage	0.53
4858:					
Malmo	85	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Slope	0.33
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
4864:					
Malmo	60	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
		Slope	0.04		
Pawnee	30	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
		Slope	0.04		
5397:					
Morrill	80	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
5480:					
Muscotah	90	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
5540:					
Nodaway	90	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Restricted permeability	0.50	Seepage	0.50
5541:					
Nodaway	85	Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.71
		Restricted permeability	0.50	Seepage	0.50

Table 13a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5970:					
Otoe	85	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
6005:					
Padonia	85	Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.04	Slope	1.00
7069:					
Steinauer	85	Very limited:		Very limited:	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
7078:					
Steinauer	85	Very limited:		Very limited:	
		Slope	1.00	Slope	1.00
		Restricted permeability	1.00		
8061:					
Wymore	90	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Depth to saturated zone	0.25
		Depth to saturated zone	1.00		
8063:					
Wymore	90	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Slope	0.33
		Depth to saturated zone	1.00	Depth to saturated zone	0.25
8080:					
Wymore	90	Very limited:		Somewhat limited:	
		Restricted permeability	1.00	Depth to saturated zone	0.25
		Depth to saturated zone	1.00		
9900:					
Arents, earthen dam	100	Not rated		Not rated	
9980:					
Pits, quarry	100	Not rated		Not rated	
9985:					
Pits, sand and gravel	100	Not rated		Not rated	
9995:					
Waste water, sewage lagoon	100	Not rated		Not rated	
9998:					
Water	100	Not rated		Not rated	

Table 13b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Somewhat limited:		Not limited		Somewhat limited:	
		Too clayey	0.50			Too clayey	0.50
1873:							
Burchard	50	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Too clayey	0.50	Slope	0.04	Too clayey	0.50
		Slope	0.04			Slope	0.04
Steinauer	35	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Too clayey	0.50	Slope	0.04	Too clayey	0.50
		Slope	0.04			Slope	0.04
1879:							
Burchard	45	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Steinauer	40	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Slope	0.96	Slope	0.96	Slope	0.96
		Too clayey	0.50			Too clayey	0.50
1930:							
Butler	92	Very limited:		Very limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	0.50			Too clayey	0.50
2076:							
Chase	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Depth to saturated zone	0.44			Depth to saturated zone	0.09
		Flooding	0.40				
2201:							
Cortland	55	Very limited:		Very limited:		Very limited:	
		Too sandy	1.00	Seepage	1.00	Seepage	1.00
		Seepage	1.00	Slope	0.04	Too sandy	0.50
		Slope	0.04			Too clayey	0.50
						Slope	0.04
Malmo	25	Very limited:		Somewhat limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.86
						Slope	0.04
2418:							
Deroin	85	Somewhat limited:		Not limited		Somewhat limited:	
		Too clayey	0.50			Too clayey	0.50
2420:							
Deroin	90	Somewhat limited:		Not limited		Somewhat limited:	
		Too clayey	0.50			Too clayey	0.50

Table 13b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2695:							
Edalgo	80	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.96	Depth to bedrock	1.00
		Slope	0.96			Slope	0.96
2832:							
Filley	95	Very limited:		Very limited:		Very limited:	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Slope	0.04	Too sandy	0.50
		Slope	0.04			Slope	0.04
2833:							
Filley	90	Very limited:		Very limited:		Very limited:	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Slope	1.00	Slope	1.00
		Slope	1.00			Too sandy	0.50
2863:							
Fluvaquents	95	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00		
3422:							
Hedville	80	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
4106:							
Judson	90	Somewhat limited:		Not limited		Somewhat limited:	
		Too clayey	0.50			Too clayey	0.50
4210:							
Kennebec	85	Very limited:		Very limited:		Not limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Flooding	0.40	Flooding	0.40		
4232:							
Kennebec	90	Very limited:		Very limited:		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
4281:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
4287:							
Kezan	85	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		

Table 13b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4298:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Carbonate content	1.00
						Too clayey	0.50
Sogn	45	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
4300:							
Kipson	50	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Carbonate content	1.00
						Too clayey	0.50
Sogn	35	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
4429:							
Lancaster	80	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.04	Slope	0.04	Slope	0.04
4858:							
Malmo	85	Very limited:		Somewhat limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Too clayey	1.00
						Depth to saturated zone	0.86
4864:							
Malmo	60	Very limited:		Somewhat limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.86
						Slope	0.04
Pawnee	30	Very limited:		Somewhat limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Too clayey	0.50	Slope	0.04	Depth to saturated zone	0.86
		Slope	0.04			Slope	0.04
5397:							
Morrill	80	Very limited:		Very limited:		Very limited:	
		Seepage	1.00	Slope	1.00	Slope	1.00
		Too sandy	1.00			Seepage	0.50
		Slope	1.00			Too sandy	0.50

Table 13b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5480:							
Muscotah	90	Very limited:		Very limited:		Very limited:	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	1.00			Depth to saturated zone	0.68
5540:							
Nodaway	90	Very limited:		Very limited:		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
5541:							
Nodaway	85	Very limited:		Very limited:		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
5970:							
Otoe	85	Very limited:		Somewhat limited:		Very limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Too clayey	1.00
		Too clayey	0.50			Depth to saturated zone	0.86
6005:							
Padonia	85	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.04	Depth to bedrock	1.00
		Slope	0.04			Slope	0.04
7069:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
7078:							
Steinauer	85	Very limited:		Very limited:		Very limited:	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
8061:							
Wymore	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50
8063:							
Wymore	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50
8080:							
Wymore	90	Very limited:		Somewhat limited:		Somewhat limited:	
		Depth to saturated zone	1.00	Depth to saturated zone	0.75	Depth to saturated zone	0.86
		Too clayey	0.50			Too clayey	0.50

Table 13b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9900: Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9980: Pits, quarry--------	100	Not rated		Not rated		Not rated	
9985: Pits, sand and gravel----------	100	Not rated		Not rated		Not rated	
9995: Waste water, sewage lagoon----------	100	Not rated		Not rated		Not rated	
9998: Water----------	100	Not rated		Not rated		Not rated	

Table 14a.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1849:					
Burchard	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1873:					
Burchard	50	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Steinauer	35	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1879:					
Burchard	45	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Steinauer	40	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1930:					
Butler	92	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2076:					
Chase	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2201:					
Cortland	55	Poor:		Fair:	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.08
Malmo	25	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2418:					
Deroin	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2420:					
Deroin	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
2695:					
Edalgo	80	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2832:					
Filley	95	Poor:		Fair:	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.72
2833:					
Filley	90	Poor:		Fair:	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.72
2863:					
Fluvaquents	95	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3422:					
Hedville	80	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4106:					
Judson	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4210:					
Kennebec	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4232:					
Kennebec	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4281:					
Kezan	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4287:					
Kezan	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4298:					
Kipson	50	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Sogn	45	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4300:					
Kipson	50	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Sogn	35	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4300:					
Rock outcrop	15	Not rated		Not rated	
4428:					
Lancaster	80	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4429:					
Lancaster	80	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4858:					
Malmo	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4864:					
Malmo	60	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Pawnee	30	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5397:					
Morrill	80	Poor:		Fair:	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.10
5480:					
Muscotah	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5540:					
Nodaway	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5541:					
Nodaway	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5970:					
Otoe	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6005:					
Padonia	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7069:					
Steinauer	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7078:					
Steinauer	85	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8061:					
Wymore	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8063:					
Wymore	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8080:					
Wymore	90	Poor:		Poor:	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9900:					
Arents, earthen dam	100	Not rated		Not rated	
9980:					
Pits, quarry	100	Not rated		Not rated	
9985:					
Pits, sand and gravel	100	Not rated		Not rated	
9995:					
Waste water, sewage lagoon	100	Not rated		Not rated	
9998:					
Water	100	Not rated		Not rated	

Table 14b.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Fair:		Poor:		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		No water erosion	0.99	Shrink-swell	0.87		
1873:							
Burchard	50	Fair:		Poor:		Fair:	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.96
		No water erosion	0.99	Shrink-swell	0.87		
Steinauer	35	Fair:		Poor:		Fair:	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.96
		No water erosion	0.99	Shrink-swell	0.87		
1879:							
Burchard	45	Fair:		Poor:		Poor:	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		No water erosion	0.99	Shrink-swell	0.87		
Steinauer	40	Fair:		Poor:		Fair:	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		No water erosion	0.99	Shrink-swell	0.87		
1930:							
Butler	92	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Too acid	0.84	Shrink-swell	0.09		
		No water erosion	0.99				
2076:							
Chase	85	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		No water erosion	0.99	Shrink-swell	0.55		
2201:							
Cortland	55	Fair:		Good		Fair:	
		Low content of organic matter	0.12			Slope	0.96
		Too acid	0.32				
		No water erosion	0.99				
Malmo	25	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.18	Shrink-swell	0.34	Depth to saturated zone	0.53
		Too acid	0.95	Depth to saturated zone	0.53	Slope	0.96
		No water erosion	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2418:							
Deroin	85	Fair:		Poor:		Fair:	
		Low content of organic matter	0.50	Low strength	0.00	Too clayey	0.44
		Too clayey	0.68	Shrink-swell	0.87		
		Too acid	0.88				
		Water erosion	0.90				
2420:							
Deroin	90	Fair:		Poor:		Fair:	
		Low content of organic matter	0.50	Low strength	0.00	Too clayey	0.44
		Too clayey	0.68	Shrink-swell	0.87		
		Too acid	0.88				
		Water erosion	0.90				
2695:							
Edalgo	80	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Depth to bedrock	0.35	Depth to bedrock	0.00	Slope	0.04
		Droughty	0.57	Shrink-swell	0.12	Depth to bedrock	0.35
		No water erosion	0.99				
2832:							
Filley	95	Fair:		Good		Fair:	
		Low content of organic matter	0.12			Slope	0.96
		Too acid	0.84				
2833:							
Filley	90	Fair:		Good		Poor:	
		Low content of organic matter	0.12			Slope	0.00
		Too acid	0.84				
2863:							
Fluvaquents	95	Poor:		Poor:		Poor:	
		Low content of organic matter	0.00	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Too clayey	0.00			Too clayey	0.00
3422:							
Hedville	80	Poor:		Poor:		Poor:	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.82	Slope	0.00
						Rock fragments	0.12
4106:							
Judson	90	Fair:		Poor:		Good	
		Water erosion	0.90	Low strength	0.00		
				Shrink-swell	0.87		
4210:							
Kennebec	85	Good		Poor:		Good	
				Low strength	0.00		
				Shrink-swell	0.87		
4232:							
Kennebec	90	Good		Poor:		Good	
				Low strength	0.00		
				Shrink-swell	0.87		

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4281:							
Kezan	85	Fair:		Poor:		Poor:	
		Water erosion	0.90	Low strength	0.00	Depth to saturated zone	0.00
				Depth to saturated zone	0.00		
4287:							
Kezan	85	Fair:		Poor:		Poor:	
		Water erosion	0.90	Low strength	0.00	Depth to saturated zone	0.00
				Depth to saturated zone	0.00		
4298:							
Kipson	50	Poor:		Poor:		Poor:	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Carbonate content	0.00	Low strength	0.00	Slope	0.00
		Droughty	0.01	Shrink-swell	0.87	Rock fragments	0.68
		Too clayey	0.92			Too clayey	0.87
Sogn	45	Poor:		Poor:		Poor:	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00	Slope	0.00
		Too clayey	0.92			Too clayey	0.87
4300:							
Kipson	50	Poor:		Poor:		Poor:	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Carbonate content	0.00	Slope	0.00	Slope	0.00
		Droughty	0.01	Low strength	0.00	Rock fragments	0.68
		Too clayey	0.92	Shrink-swell	0.87	Too clayey	0.87
Sogn	35	Poor:		Poor:		Poor:	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00	Slope	0.00
		Too clayey	0.92	Slope	0.00	Too clayey	0.87
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Fair:		Poor:		Fair:	
		Depth to bedrock	0.79	Depth to bedrock	0.00	Depth to bedrock	0.79
		Low content of organic matter	0.88				
		Too acid	0.95				
4429:							
Lancaster	80	Fair:		Poor:		Fair:	
		Depth to bedrock	0.79	Depth to bedrock	0.00	Depth to bedrock	0.79
		Low content of organic matter	0.88			Slope	0.96
		Too acid	0.95				
4858:							
Malmo	85	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.18	Shrink-swell	0.34	Depth to saturated zone	0.53
		Too acid	0.95	Depth to saturated zone	0.53		
		No water erosion	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4864:							
Malmo	60	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.18	Shrink-swell	0.34	Depth to saturated zone	0.53
		Too acid	0.95	Depth to saturated zone	0.53	Slope	0.96
		No water erosion	0.99				
Pawnee	30	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Shrink-swell	0.17	Depth to saturated zone	0.53
		No water erosion	0.99	Depth to saturated zone	0.53	Slope	0.96
5397:							
Morrill	80	Fair:		Fair:		Poor:	
		Low content of organic matter	0.12	Shrink-swell	0.99	Slope	0.00
		Too acid	0.32			Rock fragments	0.88
5480:							
Muscotah	90	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		No water erosion	0.99	Shrink-swell	0.29	Depth to saturated zone	0.76
				Depth to saturated zone	0.76		
5540:							
Nodaway	90	Fair:		Poor:			
		Low content of organic matter	0.12	Low strength	0.00	Good	
		Water erosion	0.90	Shrink-swell	0.87		
5541:							
Nodaway	85	Fair:		Poor:		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.90	Shrink-swell	0.87		
5970:							
Otoe	85	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Depth to saturated zone	0.53	Depth to saturated zone	0.53
		Too acid	0.88	Shrink-swell	0.55		
		Water erosion	0.90				
6005:							
Padonia	85	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Depth to bedrock	0.58	Depth to bedrock	0.00	Depth to bedrock	0.58
		Water erosion	0.90	Shrink-swell	0.15	Slope	0.96
		Droughty	0.92				
7069:							
Steinauer	85	Fair:		Poor:		Poor:	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		No water erosion	0.99	Slope	0.50		
				Shrink-swell	0.87		

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7078:							
Steinauer	85	Fair:		Poor:		Poor:	
		Low content of organic matter	0.12	Slope	0.00	Slope	0.00
		No water erosion	0.99	Low strength	0.00		
				Shrink-swell	0.87		
8061:							
Wymore	90	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Depth to saturated zone	0.53	Depth to saturated zone	0.53
		Water erosion	0.90	Shrink-swell	0.55		
		Too acid	0.95				
8063:							
Wymore	90	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Depth to saturated zone	0.53	Depth to saturated zone	0.53
		Water erosion	0.90	Shrink-swell	0.55		
		Too acid	0.95				
8080:							
Wymore	90	Poor:		Poor:		Poor:	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Low content of organic matter	0.12	Depth to saturated zone	0.53	Depth to saturated zone	0.53
		Water erosion	0.90	Shrink-swell	0.55		
		Too acid	0.95				
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9980:							
Pits, quarry	100	Not rated		Not rated		Not rated	
9985:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
9995:							
Waste water, sewage lagoon	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1849:							
Burchard	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Piping	0.25	Deep to water	1.00
1873:							
Burchard	50	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Piping	0.25	Deep to water	1.00
Steinauer	35	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Piping	0.08	Deep to water	1.00
1879:							
Burchard	45	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Piping	0.15	Deep to water	1.00
		Slope	0.03				
Steinauer	40	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Piping	0.08	Deep to water	1.00
		Slope	0.02				
1930:							
Butler	92	Somewhat limited:		Very limited:		Very limited:	
		Seepage	0.04	Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.74		
2076:							
Chase, rarely flooded	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Hard to pack	0.60	Deep to water	1.00
				Depth to saturated zone	0.43		
2201:							
Cortland, severely eroded	55	Very limited:		Somewhat limited:		Very limited:	
		Seepage	1.00	Seepage	0.08	Deep to water	1.00
Malmo, severely eroded	25	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.61		
2418:							
Deroin, severely eroded	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.04	Piping	0.01	Deep to water	1.00
2420:							
Deroin, severely eroded	90	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.04	Piping	0.01	Deep to water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2695:							
Edalgo	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Depth to bedrock	0.17	Thin layer	0.91	Deep to water	1.00
		Slope	0.02	Hard to pack	0.68		
2832:							
Filley	95	Very limited:		Somewhat limited:		Very limited:	
		Seepage	1.00	Seepage	0.72	Deep to water	1.00
2833:							
Filley	90	Very limited:		Somewhat limited:		Very limited:	
		Seepage	1.00	Seepage	0.72	Deep to water	1.00
		Slope	0.03				
2863:							
Fluvaquents	95	Very limited:		Very limited:		Somewhat limited:	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	0.10
				Depth to saturated zone	1.00		
3422:							
Hedville	80	Very limited:		Very limited:		Very limited:	
		Depth to bedrock	1.00	Thin layer	1.00	Deep to water	1.00
		Slope	0.08	Piping	1.00		
				Seepage	0.01		
4106:							
Judson	90	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.70	Piping	0.01	Deep to water	1.00
4210:							
Kennebec, rarely flooded	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Seepage	0.70	Piping	0.56	Deep to water	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
4232:							
Kennebec, occasionally flooded	90	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Seepage	0.70	Piping	0.56	Deep to water	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
4281:							
Kezan, channeled	85	Somewhat limited:		Very limited:		Somewhat limited:	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Cutbanks cave	0.10
				Piping	0.50		
4287:							
Kezan, occasionally flooded	85	Somewhat limited:		Very limited:		Somewhat limited:	
		Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
						Cutbanks cave	0.10
				Piping	0.50		

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4298:							
Kipson	50	Somewhat limited:		Very limited:		Very limited:	
		Depth to bedrock	0.58	Thin layer	1.00	Deep to water	1.00
		Slope	0.03	Piping	0.02		
Sogn	45	Very limited:		Very limited:		Very limited:	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	1.00				
		Slope	0.03				
4300:							
Kipson	50	Somewhat limited:		Very limited:		Very limited:	
		Depth to bedrock	0.58	Thin layer	1.00	Deep to water	1.00
		Slope	0.50	Piping	0.02		
Sogn	35	Very limited:		Very limited:		Very limited:	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	1.00				
		Slope	0.50				
Rock outcrop	15	Not rated		Not rated		Not rated	
4428:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.72	Thin layer	0.77	Deep to water	1.00
		Depth to bedrock	0.06	Piping	0.59		
4429:							
Lancaster	80	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.72	Thin layer	0.77	Deep to water	1.00
		Depth to bedrock	0.06	Piping	0.59		
4858:							
Malmo, severely eroded	85	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.61		
4864:							
Malmo, severely eroded	60	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.61		
Pawnee	30	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.87		
5397:							
Morrill	80	Very limited:		Somewhat limited:		Very limited:	
		Seepage	1.00	Seepage	0.10	Deep to water	1.00
		Slope	0.03				

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5480:							
Muscotah, occasionally flooded	90	Somewhat limited:		Somewhat limited:		Very limited:	
		Seepage	0.05	Depth to saturated zone	0.95	Slow refill	1.00
				Hard to pack	0.79	Cutbanks cave	0.10
						Deep to water	0.02
5540:							
Nodaway, occasionally flooded	90	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Seepage	0.70	Piping	0.68	Deep to water	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
5541:							
Nodaway, channeled	85	Somewhat limited:		Somewhat limited:		Somewhat limited:	
		Seepage	0.70	Piping	0.68	Deep to water	0.81
						Slow refill	0.30
						Cutbanks cave	0.10
5970:							
Otoe, severely eroded	85	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.62		
6005:							
Padonia	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Depth to bedrock	0.11	Thin layer	0.85	Deep to water	1.00
		Seepage	0.05	Hard to pack	0.11		
7069:							
Steinauer	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.12	Piping	0.08	Deep to water	1.00
		Seepage	0.05				
7078:							
Steinauer	85	Somewhat limited:		Somewhat limited:		Very limited:	
		Slope	0.97	Piping	0.08	Deep to water	1.00
		Seepage	0.05				
8061:							
Wymore	90	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.68		
8063:							
Wymore	90	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.68		
8080:							
Wymore	90	Not limited		Very limited:		Very limited:	
				Depth to saturated zone	1.00	Deep to water	1.00
				Hard to pack	0.68		

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9900: Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9980: Pits, quarry--------	100	Not rated		Not rated		Not rated	
9985: Pits, sand and gravel----------	100	Not rated		Not rated		Not rated	
9995: Waste water, sewage lagoon----------	100	Not rated		Not rated		Not rated	
9998: Water----------	100	Not rated		Not rated		Not rated	

Table 16.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1849:												
Burchard-------	0-13	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-95	60-80	36-39	15-18
	13-19	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	36-44	15-22
	19-29	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
	29-37	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
	37-60	Clay loam	CL	A-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
1873:												
Burchard-------	0-13	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-95	60-80	36-39	15-18
	13-19	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	36-44	15-22
	19-29	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	34-38	14-18
	29-37	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
	37-60	Clay loam	CL	A-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
Steinauer------	0-6	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	55-90	36-41	16-20
	6-15	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	70-90	36-41	16-20
	15-41	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
	41-60	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
1879:												
Burchard-------	0-13	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-95	60-80	36-39	15-18
	13-19	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	36-44	15-22
	19-29	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	34-39	9-22
	29-37	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	24-39	14-18
	37-60	Clay loam	CL	A-6	0	0-5	95-100	85-100	75-95	60-80	34-39	14-18
Steinauer------	0-6	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	55-90	36-41	16-20
	6-15	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	70-90	36-41	16-20
	15-41	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
	41-60	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
1930:												
Butler---------	0-6	Silt loam	CL	A-6	0	0	100	100	100	95-100	28-43	9-22
	6-10	Silt loam	CL	A-6	0	0	100	100	100	95-100	28-43	9-22
	10-12	Silt loam	CL	A-6	0	0	100	100	100	95-100	28-43	9-22
	12-25	Silty clay	CH	A-7-6	0	0	100	100	100	95-100	61-71	37-45
	25-34	Silty clay	CH	A-7-6	0	0	100	100	100	95-100	61-71	37-45
	34-43	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	39-61	27-37
	43-60	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	36-51	17-30
2076:												
Chase----------	0-9	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	43-51	22-29
	9-19	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	43-56	22-33
	19-30	Silty clay	CH	A-7-6	0	0	100	100	90-100	75-95	51-71	29-45
	30-41	Silty clay	CH	A-7-6	0	0	100	100	90-100	75-95	51-71	29-45
	41-47	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	43-56	22-33
	47-80	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	43-56	22-33
2201:												
Cortland-------	0-6	Loam	CL	A-6	0	0	95-100	75-100	65-95	50-75	25-36	8-16
	6-15	Clay loam	CL	A-6	0	0	85-100	65-98	50-95	25-80	28-44	9-22
	15-28	Clay loam	CL	A-6	0	0	85-100	65-98	50-95	25-80	28-44	9-22
	28-36	Sandy loam	SC	A-2-4	0	0	85-100	65-98	35-85	15-80	15-44	NP-22
	36-40	Loamy sand	SC	A-1-b	0	0	85-100	65-98	35-95	15-80	14-39	NP-18
	40-50	Loamy sand	SC	A-1-b	0	0	85-100	65-98	35-95	15-80	13-39	NP-18
	50-80	Loamy sand	SC	A-1-b	0	0	85-100	65-98	35-95	15-80	13-39	NP-18

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
2201:												
Malmo	0-6	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	44-56	22-33
	6-15	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	15-25	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	25-39	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	39-43	Gravelly clay	CH	A-7-6	0	0	95-100	75-85	65-75	60-70	51-66	29-41
	43-54	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	34-63	15-39
	54-80	Loam	CL	A-7-6	0	0	95-100	90-100	65-95	60-95	34-63	15-39
2418:												
Deroin	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	85-95	36-48	16-25
	7-12	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	12-18	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	18-40	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	40-50	Silty clay loam	CL	A-6	0	0	100	100	90-100	70-95	34-41	14-20
	50-80	Silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-95	34-41	14-20
2420:												
Deroin	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	85-95	36-48	16-25
	7-12	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	12-18	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	18-40	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	70-95	36-44	16-22
	40-50	Silty clay loam	CL	A-6	0	0	100	100	90-100	70-95	34-41	14-20
	50-80	Silty clay loam	CL	A-6	0	0	100	100	90-100	70-95	34-41	14-20
2695:												
Edalgo	0-4	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	35-45	15-20
	4-8	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	35-45	15-20
	8-28	Clay	CL	A-7-6	0	0	95-100	85-100	75-100	70-90	44-68	22-45
	28-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2832:												
Filley	0-6	Fine sandy loam	SC	A-4	0	0	100	100	85-95	30-50	21-28	4-9
	6-12	Fine sandy loam	SC	A-4	0	0	100	100	85-95	30-50	21-28	4-9
	12-23	Fine sandy loam	SC	A-4	0	0	100	100	85-95	35-50	21-26	4-8
	23-30	Fine sandy loam	SC	A-4	0	0	100	100	85-95	35-50	21-26	4-8
	30-80	Loamy fine sand	SC-SM	A-2-4	0	0	100	100	80-95	5-20	15-21	NP-4
2833:												
Filley	0-6	Fine sandy loam	SC	A-4	0	0	100	100	85-95	30-50	21-28	4-9
	6-12	Fine sandy loam	SC	A-4	0	0	100	100	85-95	30-50	21-28	4-9
	12-23	Fine sandy loam	SC	A-4	0	0	100	100	85-95	35-50	21-26	4-8
	23-30	Fine sandy loam	SC	A-4	0	0	100	100	85-95	35-50	21-26	4-8
	30-80	Loamy fine sand	SC-SM	A-2-4	0	0	100	100	80-95	5-20	15-21	NP-4
2863:												
Fluvaquents	0-20	Silty clay	CL	A-7-6	0	0	100	100	85-100	45-95	35-66	15-40
	20-80	Stratified variable	GP	A-1-a	0	0	---	---	---	---	---	---
3422:												
Hedville	0-10	Cobbly loam	SC	A-4	0	15-25	80-100	75-100	40-100	10-70	20-30	3-11
	10-16	Cobbly loam	ML	A-4	0	2-15	80-100	75-100	30-90	15-90	18-30	2-11
	16-22	Bedrock	---	---	---	---	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
4106:												
Judson	0-6	Silt loam	CL	A-6	0	0	100	100	100	95-100	34-36	14-16
	6-12	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	36-41	16-20
	12-22	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	36-41	16-20
	22-31	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	36-41	16-20
	31-43	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	36-44	16-22
	43-54	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	36-44	16-22
	54-69	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	36-44	16-22
	69-80	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	36-44	16-22
4210:												
Kennebec	0-10	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	10-19	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	19-45	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	45-56	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
	56-70	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
	70-80	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
4232:												
Kennebec	0-10	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	10-19	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	19-45	Silt loam	CL	A-6	0	0	100	100	95-100	90-100	27-36	9-17
	45-56	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
	56-70	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
	70-80	Silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	34-40	14-19
4281:												
Kezan	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	70-90	30-36	11-16
	6-13	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	13-19	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	19-32	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	32-44	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	44-60	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
4287:												
Kezan	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	70-90	30-36	11-16
	6-13	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	13-19	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	19-32	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	32-44	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
	44-60	Stratified silt loam	CL	A-6	0	0	100	100	95-100	80-95	34-44	14-22
4298:												
Kipson	0-9	Channery silty clay loam	CL	A-6	0	0-25	80-100	70-100	65-100	60-95	36-44	16-22
	9-17	Channery silty clay loam	CL	A-6	0	0-25	80-100	75-100	70-100	50-95	28-44	9-22
	17-36	Bedrock	---	---	---	---	---	---	---	---	---	---
Sogn	0-4	Clay loam	CL	A-7-6	0	0-10	85-100	85-100	80-100	65-80	36-43	16-21
	4-8	Clay loam	CL	A-7-6	0	0-10	85-100	85-100	80-100	65-80	36-43	16-21
	8-12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
4300:												
Kipson	0-9	Channery silty clay loam	CL	A-6	0	0-25	80-100	70-100	65-100	60-95	36-44	16-22
	9-17	Channery silty clay loam	CL	A-6	0	0-25	80-100	75-100	70-100	50-95	28-44	9-22
	17-36	Bedrock	---	---	---	---	---	---	---	---	---	---
Sogn	0-4	Clay loam	CL	A-7-6	0	0-10	85-100	85-100	80-100	65-80	36-43	16-21
	4-8	Clay loam	CL	A-7-6	0	0-10	85-100	85-100	80-100	65-80	36-43	16-21
	8-12	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	0-0	---
4428:												
Lancaster	0-8	Loam	CL	A-6	0	0-5	90-100	85-100	85-100	60-90	23-36	6-16
	8-12	Loam	CL, CL-ML	A-6	0	0-5	90-100	85-100	85-100	60-90	23-36	6-16
	12-21	Clay loam	CL	A-7-6	0	0-5	90-100	85-100	80-95	40-90	28-44	9-22
	21-33	Loam	CL	A-6	0	0-5	90-100	85-100	80-95	40-90	23-39	6-18
	33-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
4429:												
Lancaster	0-8	Loam	CL	A-6	0	0-5	90-100	85-100	85-100	60-90	23-36	6-16
	8-12	Loam	CL	A-6	0	0-5	90-100	85-100	85-100	60-90	23-36	6-16
	12-21	Clay loam	CL	A-7-6	0	0-5	90-100	85-100	80-95	40-90	28-44	9-22
	21-33	Loam	CL	A-6	0	0-5	90-100	85-100	80-95	40-90	23-39	6-18
	33-40	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
4858:												
Malmo	0-6	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	44-56	22-33
	6-15	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	15-25	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	25-39	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	39-43	Gravelly clay	CH	A-7-6	0	0	95-100	75-85	65-75	60-70	51-66	29-41
	43-54	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	34-63	15-39
	54-80	Loam	CL	A-7-6	0	0	95-100	90-100	65-95	60-95	34-63	15-39
4864:												
Malmo	0-6	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	44-56	22-33
	6-15	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	15-25	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	25-39	Clay	CH	A-7-6	0	0	100	95-100	85-100	80-95	51-66	29-41
	39-43	Gravelly clay	CH	A-7-6	0	0	95-100	75-85	65-75	60-70	51-66	29-41
	43-54	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	34-63	15-39
	54-80	Loam	CL	A-7-6	0	0	95-100	90-100	65-95	60-95	34-63	15-39
Pawnee	0-6	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	36-56	15-33
	6-10	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	36-56	16-33
	10-14	Clay loam	CL	A-7-6	0	0	95-100	95-100	85-100	70-90	36-56	16-33
	14-24	Clay	CH	A-7-6	0	0	95-100	95-100	85-100	70-85	56-66	33-41
	24-32	Clay	CH	A-7-6	0	0	95-100	95-100	85-100	70-85	56-66	33-41
	32-45	Clay	CH	A-7-6	0	0	95-100	95-100	85-100	70-85	56-66	33-41
	45-53	Clay	CH	A-7-6	0	0	95-100	95-100	85-100	70-85	56-66	33-41
	53-80	Clay loam	CL	A-7-6	0	0	95-100	95-100	80-100	70-90	31-56	14-33

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
5397:												
Morrill--------	0-6	Loam	CL	A-6	0	0	95-100	75-100	65-100	50-80	25-36	8-16
	6-12	Loam	CL	A-6	0	0	95-100	75-100	65-100	50-80	28-44	9-22
	12-22	Loam	CL	A-6	0	0	85-100	70-100	55-100	25-80	28-44	9-22
	22-30	Sandy clay loam	CL	A-6	0	0	85-100	70-100	55-100	25-80	28-44	9-22
	30-35	Sandy clay loam	CL	A-6	0	0	85-100	70-100	55-100	25-80	28-44	9-22
	35-43	Sandy clay loam	CL	A-6	0	0	85-100	70-100	55-100	25-80	28-44	9-22
	43-52	Fine sandy loam	SC	A-4	0	0	90-100	70-100	45-85	25-50	15-39	NP-18
	52-59	Fine sandy loam	SC	A-2-4	0	0	90-100	70-100	45-95	10-40	10-39	NP-18
	59-73	Loamy fine sand	SC	A-2-4	0	0	90-100	70-100	45-95	10-40	10-39	NP-18
	73-80	Sand	SC	A-2-4	0	0	90-100	70-100	45-95	10-40	10-39	NP-18
5480:												
Muscotah-------	0-9	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	36-56	16-33
	9-16	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	36-56	16-33
	16-23	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-95	36-56	16-33
	23-35	Silty clay	CH	A-7-6	0	0	100	100	95-100	85-95	51-66	29-41
	35-44	Silty clay	CH	A-7-6	0	0	100	100	95-100	85-95	51-66	29-41
	44-60	Silty clay	CH	A-7-6	0	0	100	100	95-100	85-95	51-66	29-41
	60-70	Silty clay	CH	A-7-6	0	0	100	100	95-100	85-95	51-66	29-41
	70-80	Silty clay	CH	A-7-6	0	0	100	100	95-100	85-95	51-66	29-41
5540:												
Nodaway--------	0-7	Silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-36	9-16
	7-14	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
	14-45	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
	45-60	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
5541:												
Nodaway--------	0-7	Silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-36	9-16
	7-14	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
	14-45	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
	45-60	Stratified silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-39	9-18
5970:												
Otoe-----------	0-6	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	46-56	25-33
	6-15	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	51-71	29-45
	15-22	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	51-71	29-45
	22-32	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	51-71	29-45
	32-40	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	41-56	21-33
	40-50	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	41-56	21-33
	50-57	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	41-56	21-33
	57-80	Silty clay loam	CL	A-7-6	0	0	100	95-100	80-95	70-95	43-56	22-33
6005:												
Padonia--------	0-11	Silty clay loam	CL	A-6	0	0	100	100	90-100	80-95	35-45	15-20
	11-22	Silty clay	CL	A-7-6	0	0	100	100	95-100	90-95	45-60	20-30
	22-32	Silty clay	CL	A-7	0	0	100	100	95-100	90-95	45-60	20-30
	32-37	Silty clay loam	CL	A-7-6	0	0	100	100	90-100	80-95	45-50	20-25
	37-41	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7069:												
Steinauer------	0-6	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	55-90	36-41	16-20
	6-15	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	70-90	36-41	16-20
	15-41	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
	41-60	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7078:												
Steinauer------	0-6	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	55-90	36-41	16-20
	6-15	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	70-90	36-41	16-20
	15-41	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
	41-60	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-44	14-22
8061:												
Wymore---------	0-5	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	36-56	16-33
	5-9	Silty clay	CL	A-7-6	0	0	100	100	95-100	95-100	39-61	18-37
	9-17	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	17-25	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	25-32	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	32-40	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
	40-53	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
	53-80	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
8063:												
Wymore---------	0-5	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	36-56	16-33
	5-9	Silty clay	CL	A-7-6	0	0	100	100	95-100	95-100	39-61	18-37
	9-17	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	17-25	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	25-32	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	32-40	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
	40-53	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
	53-80	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
8080:												
Wymore---------	0-5	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	36-56	16-33
	5-9	Silty clay	CL	A-7-6	0	0	100	100	95-100	95-100	39-61	18-37
	9-17	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	17-25	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	25-32	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	58-71	35-45
	32-40	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
	40-80	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-56	23-33
9900:												
Arents, earthen dam.												
9980:												
Pits, quarry---	0-60	Bouldery fragmental material	GP	A-1-a	---	---	---	---	---	---	0-0	---
9985:												
Pits, sand and gravel--------	0-60	Gravelly sand	GP-GM, SM, SP, SP-SM	A-1, A-2, A-3	---	0-5	45-100	40-100	0-80	0-40	0-14	NP
9995:												
Waste water, sewage lagoon.												
9998:												
Water.												

Table 17.--Physical Properties of the Soils

(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.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
1849:												
Burchard--------	0-13	27-30	1.25-1.45	0.20-0.60	0.17-0.19	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	13-19	27-35	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	19-29	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	29-37	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	37-60	24-30	1.55-1.65	0.20-0.60	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
1873:												
Burchard--------	0-13	27-30	1.25-1.45	0.20-0.60	0.17-0.19	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	13-19	27-35	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	19-29	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	29-37	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	37-60	24-30	1.55-1.65	0.20-0.60	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Steinauer-------	0-6	27-32	1.20-1.35	0.20-0.60	0.19-0.22	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	6-15	27-32	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	15-41	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
	41-60	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
1879:												
Burchard--------	0-13	27-30	1.25-1.45	0.20-0.60	0.17-0.19	3.0-5.9	2.0-4.0	.28	.28	5	6	48
	13-19	27-35	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	19-29	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	29-37	24-30	1.40-1.60	0.20-0.60	0.15-0.17	3.0-5.9	0.5-1.0	.37	.37			
	37-60	24-30	1.55-1.65	0.20-0.60	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
Steinauer-------	0-6	27-32	1.20-1.35	0.20-0.60	0.19-0.22	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	6-15	27-32	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	15-41	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
	41-60	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
1930:												
Butler----------	0-6	18-27	1.10-1.40	0.60-2.00	0.22-0.24	3.0-5.9	2.0-4.0	.37	.37	3	6	48
	6-10	18-27	1.20-1.60	0.60-2.00	0.22-0.24	3.0-5.9	2.0-4.0	.37	.37			
	10-12	18-27	1.20-1.60	0.60-2.00	0.22-0.24	3.0-5.9	1.0-2.0	.37	.37			
	12-25	45-55	1.25-1.45	0.01-0.06	0.11-0.13	9.0-11.9	1.0-2.0	.37	.37			
	25-34	45-55	1.25-1.45	0.01-0.06	0.11-0.13	9.0-11.9	1.0-2.0	.37	.37			
	34-43	32-45	1.25-1.45	0.06-0.20	0.14-0.20	6.0-8.9	0.5-1.0	.37	.37			
	43-60	20-35	1.25-1.45	0.20-0.60	0.18-0.22	3.0-5.9	0.0-0.5	.37	.37			
2076:												
Chase, rarely flooded--------	0-9	27-35	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	9-19	27-40	1.30-1.40	0.20-0.60	0.18-0.20	3.0-5.9	2.0-4.0	.37	.37			
	19-30	35-55	1.35-1.50	0.06-0.20	0.11-0.19	6.0-8.9	1.0-3.0	.28	.28			
	30-41	35-55	1.35-1.50	0.06-0.20	0.11-0.19	6.0-8.9	1.0-3.0	.28	.28			
	41-47	27-40	1.35-1.50	0.20-0.60	0.11-0.18	3.0-5.9	0.5-2.0	.37	.37			
	47-80	27-40	1.35-1.50	0.20-0.60	0.11-0.18	3.0-5.9	0.5-2.0	.37	.37			
2201:												
Cortland, severely eroded	0-6	15-27	1.30-1.65	0.60-2.00	0.16-0.19	0.0-2.9	1.0-2.0	.28	.28	4	6	48
	6-15	18-35	1.40-1.60	0.20-2.00	0.15-0.19	3.0-6.0	0.5-1.0	.37	.37			
	15-28	18-35	1.40-1.60	0.20-2.00	0.15-0.19	3.0-6.0	0.5-1.0	.37	.37			
	28-36	2-35	1.50-1.70	0.20-6.00	0.08-0.18	0.0-2.9	0.0-0.5	.28	.28			
	36-40	2-30	1.55-1.75	0.20-20.00	0.05-0.16	0.0-2.9	0.0-0.5	.17	.17			
	40-50	1-30	1.55-1.75	0.20-20.00	0.05-0.16	0.0-2.9	0.0-0.5	.17	.17			
	50-80	1-30	1.55-1.75	0.20-20.00	0.05-0.16	0.0-2.9	0.0-0.5	.17	.17			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
2201:												
Malmo, severely eroded	0-6	35-40	1.35-1.45	0.06-0.20	0.17-0.19	6.0-8.9	1.0-3.0	.37	.37	4	4	86
	6-15	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	15-25	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-39	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	39-43	35-50	1.30-1.50	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.28	.32			
	43-54	20-45	1.40-1.60	0.06-0.20	0.09-0.17	3.0-5.9	0.5-1.0	.32	.32			
	54-80	20-45	1.45-1.65	0.06-0.20	0.09-0.19	3.0-5.9	0.1-0.5	.32	.32			
2418:												
Deroin, severely eroded	0-7	27-40	1.20-1.40	0.20-0.60	0.21-0.23	3.0-5.9	1.0-3.0	.37	.37	4	7	38
	7-12	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	12-18	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	18-40	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	40-50	24-32	1.30-1.50	0.20-0.60	0.16-0.20	3.0-5.9	0.0-0.5	.43	.43			
	50-80	24-32	1.30-1.50	0.20-0.60	0.16-0.20	3.0-5.9	0.0-0.5	.43	.43			
2420:												
Deroin, severely eroded	0-7	27-40	1.20-1.40	0.20-0.60	0.21-0.23	3.0-5.9	1.0-3.0	.37	.37	4	7	38
	7-12	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	12-18	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	18-40	27-35	1.35-1.45	0.20-0.60	0.17-0.20	3.0-5.9	0.0-1.0	.43	.43			
	40-50	24-32	1.30-1.50	0.20-0.60	0.16-0.20	3.0-5.9	0.0-0.5	.43	.43			
	50-80	24-32	1.30-1.50	0.20-0.60	0.16-0.20	3.0-5.9	0.0-0.5	.43	.43			
2695:												
Edalgo	0-4	27-35	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	---	3	7	38
	4-8	27-35	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	1.0-2.0	.37	---			
	8-28	35-65	1.40-1.60	0.01-0.06	0.10-0.18	6.0-8.9	1.0-2.0	.37	.37			
	28-40	---	---	0.00-0.01	0.00-0.00	---	---	---	---			
2832:												
Filley	0-6	10-18	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	6-12	10-18	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.20	.20			
	12-23	10-15	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.17	.17			
	23-30	10-15	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.17	.17			
	30-80	4-10	1.50-1.70	6.00-20.00	0.08-0.10	0.0-2.9	0.0-0.5	.20	.20			
2833:												
Filley	0-6	10-18	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	6-12	10-18	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.20	.20			
	12-23	10-15	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.17	.17			
	23-30	10-15	1.45-1.65	2.00-6.00	0.12-0.15	0.0-2.9	0.5-1.0	.17	.17			
	30-80	4-10	1.50-1.70	6.00-20.00	0.08-0.10	0.0-2.9	0.0-0.5	.20	.20			
2863:												
Fluvaquents	0-20	35-60	1.00-1.40	0.06-0.20	0.13-0.17	3.0-5.9	2.0-8.0	.32	.32	5	8	0
	20-80	---	---	0.01-20.00	0.16-0.22	---	---	---	---			
3422:												
Hedville	0-10	8-20	1.30-1.50	0.60-2.00	0.14-0.18	0.0-2.9	1.0-4.0	.20	.20	2	5	56
	10-16	6-20	1.45-1.65	0.60-2.00	0.14-0.18	0.0-2.9	1.0-4.0	.28	.28			
	16-22	---	---	0.06-0.20	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
4106:												
Judson----------	0-6	24-27	1.20-1.40	0.60-2.00	0.21-0.23	0.0-2.9	2.0-4.0	.28	.28	5	6	48
	6-12	27-32	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	2.0-4.0	.28	.28			
	12-22	27-32	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	2.0-4.0	.28	.28			
	22-31	27-32	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	2.0-4.0	.28	.28			
	31-43	27-35	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	1.0-3.0	.43	.43			
	43-54	27-35	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	0.5-2.0	.43	.43			
	54-69	27-35	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	0.5-2.0	.43	.43			
	69-80	27-35	1.25-1.45	0.60-2.00	0.21-0.23	3.0-5.9	0.5-2.0	.43	.43			
4210:												
Kennebec, rarely flooded--------	0-10	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28	5	6	48
	10-19	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
	19-45	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
	45-56	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
	56-70	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
	70-80	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
4232:												
Kennebec, occasionally flooded--------	0-10	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28	5	6	48
	10-19	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
	19-45	22-27	1.25-1.45	0.60-2.00	0.22-0.24	3.0-5.9	5.0-6.0	.28	.28			
	45-56	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
	56-70	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
	70-80	24-30	1.25-1.35	0.60-2.00	0.20-0.22	3.0-5.9	1.0-2.0	.43	.43			
4281:												
Kezan, channeled	0-6	20-27	1.20-1.40	0.60-2.00	0.22-0.24	0.0-2.9	2.0-4.0	.32	.32	5	6	48
	6-13	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.32	.32			
	13-19	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	0.5-1.0	.43	.43			
	19-32	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	0.5-1.0	.43	.43			
	32-44	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.43	.43			
	44-60	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.43	.43			
4287:												
Kezan, occasionally flooded--------	0-6	20-27	1.20-1.40	0.60-2.00	0.22-0.24	0.0-2.9	2.0-4.0	.32	.32	5	6	48
	6-13	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.32	.32			
	13-19	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	0.5-1.0	.43	.43			
	19-32	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	0.5-1.0	.43	.43			
	32-44	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.43	.43			
	44-60	24-35	1.20-1.40	0.60-2.00	0.18-0.22	0.0-2.9	1.0-3.0	.43	.43			
4298:												
Kipson----------	0-9	27-35	1.20-1.40	0.60-2.00	0.17-0.20	3.0-5.9	1.0-3.0	.32	.49	2	4L	86
	9-17	18-35	1.25-1.45	0.60-2.00	0.15-0.20	3.0-5.9	0.5-1.0	.32	.43			
	17-36	---	---	0.00-0.00	---	---	---	---	---			
Sogn----------	0-4	27-35	1.10-1.30	0.60-2.00	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28	1	4L	86
	4-8	27-35	1.10-1.30	0.60-2.00	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28			
	8-12	---	---	0.00-0.00	---	---	---	---	---			
4300:												
Kipson----------	0-9	27-35	1.20-1.40	0.60-2.00	0.17-0.20	3.0-5.9	1.0-3.0	.32	.49	2	4L	86
	9-17	18-35	1.25-1.45	0.60-2.00	0.15-0.20	3.0-5.9	0.5-1.0	.32	.43			
	17-36	---	---	0.00-0.00	---	---	---	---	---			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
4300:												
Sogn	0-4	27-35	1.10-1.30	0.60-2.00	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28	1	4L	86
	4-8	27-35	1.10-1.30	0.60-2.00	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28			
	8-12	---	---	0.00-0.00	---	---	---	---	---			
Rock outcrop	0-60	0-0	---	0.00-0.00	0.00-0.00	---	---	---	---	-	8	0
4428:												
Lancaster	0-8	12-27	1.35-1.45	0.60-2.00	0.20-0.22	0.0-3.0	1.0-3.0	.28	.28	3	6	48
	8-12	12-27	1.35-1.45	0.60-2.00	0.20-0.22	0.0-3.0	1.0-3.0	.28	.28			
	12-21	18-35	1.35-1.55	0.60-2.00	0.17-0.19	3.0-6.0	0.5-2.0	.28	.28			
	21-33	12-30	1.35-1.45	0.60-2.00	0.17-0.19	0.0-3.0	0.5-1.0	.28	.28			
	33-40	---	---	0.20-0.60	---	---	---	---	---			
4429:												
Lancaster	0-8	12-27	1.35-1.45	0.60-2.00	0.20-0.22	0.0-3.0	1.0-3.0	.28	.28	3	6	48
	8-12	12-27	1.35-1.45	0.60-2.00	0.20-0.22	0.0-3.0	1.0-3.0	.28	.28			
	12-21	18-35	1.35-1.55	0.60-2.00	0.17-0.19	3.0-6.0	0.5-2.0	.28	.28			
	21-33	12-30	1.35-1.45	0.60-2.00	0.17-0.19	0.0-3.0	0.5-1.0	.28	.28			
	33-40	---	---	0.20-0.60	---	---	---	---	---			
4858:												
Malmo, severely eroded	0-6	35-40	1.35-1.45	0.06-0.20	0.17-0.19	6.0-8.9	1.0-3.0	.37	.37	4	4	86
	6-15	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	15-25	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-39	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	39-43	35-50	1.30-1.50	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.28	.32			
	43-54	20-45	1.40-1.60	0.06-0.20	0.09-0.17	3.0-5.9	0.5-1.0	.32	.32			
	54-80	20-45	1.45-1.65	0.06-0.20	0.09-0.19	3.0-5.9	0.1-0.5	.32	.32			
4864:												
Malmo, severely eroded	0-6	35-40	1.35-1.45	0.06-0.20	0.17-0.19	6.0-8.9	1.0-3.0	.37	.37	4	4	86
	6-15	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	15-25	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-39	35-50	1.20-1.40	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.32	.32			
	39-43	35-50	1.30-1.50	0.01-0.06	0.10-0.14	6.0-8.9	0.5-1.0	.28	.32			
	43-54	20-45	1.40-1.60	0.06-0.20	0.09-0.17	3.0-5.9	0.5-1.0	.32	.32			
	54-80	20-45	1.45-1.65	0.06-0.20	0.09-0.19	3.0-5.9	0.1-0.5	.32	.32			
Pawnee	0-6	27-40	1.30-1.60	0.20-0.60	0.17-0.19	3.0-5.9	2.0-4.0	.37	.37	5	6	48
	6-10	27-40	1.30-1.60	0.20-0.60	0.17-0.19	3.0-5.9	2.0-3.0	.37	.37			
	10-14	27-40	1.30-1.60	0.06-0.20	0.17-0.19	3.0-5.9	2.0-3.0	.37	.37			
	14-24	40-48	1.30-1.60	0.01-0.06	0.09-0.11	6.0-8.9	1.0-2.0	.37	.37			
	24-32	40-48	1.30-1.60	0.01-0.06	0.09-0.11	6.0-8.9	1.0-2.0	.37	.37			
	32-45	40-48	1.30-1.60	0.01-0.06	0.09-0.11	6.0-8.9	1.0-2.0	.37	.37			
	45-53	40-48	1.40-1.70	0.01-0.06	0.09-0.11	6.0-8.9	0.5-1.0	.37	.37			
	53-80	15-40	1.40-1.70	0.06-0.20	0.14-0.16	6.0-8.9	0.0-0.5	.37	.37			
5397:												
Morrill	0-6	15-27	1.30-1.65	0.60-2.00	0.15-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	6-12	18-35	1.30-1.40	0.60-2.00	0.14-0.21	0.0-2.9	1.0-2.0	.28	.28			
	12-22	18-35	1.40-1.60	0.60-2.00	0.15-0.19	3.0-6.0	0.5-1.0	.32	.32			
	22-30	18-35	1.40-1.60	0.20-0.60	0.15-0.19	3.0-6.0	0.5-1.0	.32	.32			
	30-35	18-35	1.40-1.60	0.20-0.60	0.15-0.19	3.0-6.0	0.5-1.0	.32	.32			
	35-43	18-35	1.40-1.60	0.20-0.60	0.15-0.19	3.0-6.0	0.5-1.0	.32	.32			
	43-52	2-35	1.35-1.45	2.00-6.00	0.13-0.15	0.0-2.9	0.0-0.5	.24	.24			
	52-59	1-30	1.50-1.70	2.00-6.00	0.05-0.16	0.0-2.9	0.0-0.5	.15	.17			
	59-73	1-30	1.50-1.70	2.00-6.00	0.05-0.16	0.0-2.9	0.0-0.5	.15	.17			
	73-80	1-30	1.50-1.70	2.00-6.00	0.05-0.16	0.0-2.9	0.0-0.5	.15	.17			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
5480:												
Muscotah, occasionally flooded	0-9	27-40	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	9-16	27-40	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	16-23	27-40	1.30-1.40	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	23-35	35-50	1.20-1.30	0.06-0.20	0.11-0.20	6.0-8.9	1.0-2.0	.28	.28			
	35-44	35-50	1.20-1.30	0.06-0.20	0.11-0.20	6.0-8.9	1.0-2.0	.28	.28			
	44-60	35-50	1.20-1.30	0.06-0.20	0.11-0.20	6.0-8.9	1.0-2.0	.28	.28			
	60-70	35-50	1.20-1.30	0.01-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.28	.28			
	70-80	35-50	1.20-1.30	0.01-0.06	0.10-0.20	6.0-8.9	0.5-1.0	.28	.28			
5540:												
Nodaway, occasionally flooded	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	0.0-2.9	2.0-3.0	.32	.32	5	6	48
	7-14	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
	14-45	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
	45-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
5541:												
Nodaway, channeled	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	0.0-2.9	2.0-3.0	.32	.32	5	6	48
	7-14	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
	14-45	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
	45-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	3.0-5.9	0.0-0.5	.43	.43			
5970:												
Otoe, severely eroded	0-6	30-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-6.0	2.0-4.0	.37	.37	4	7	48
	6-15	35-55	1.30-1.50	0.01-0.06	0.11-0.16	6.0-9.0	0.5-1.0	.32	.32			
	15-22	35-55	1.30-1.50	0.01-0.06	0.11-0.16	6.0-9.0	0.5-1.0	.32	.32			
	22-32	35-55	1.30-1.50	0.01-0.06	0.11-0.16	6.0-9.0	0.5-1.0	.32	.32			
	32-40	27-40	1.30-1.50	0.06-0.20	0.16-0.20	3.0-6.0	0.0-0.5	.43	.43			
	40-50	27-40	1.30-1.50	0.06-0.20	0.16-0.20	3.0-6.0	0.0-0.5	.43	.43			
	50-57	27-40	1.30-1.50	0.06-0.20	0.16-0.20	3.0-6.0	0.0-0.5	.43	.43			
	57-80	27-40	1.30-1.50	0.06-0.20	0.14-0.18	3.0-6.0	0.0-0.5	.37	.37			
6005:												
Padonia	0-11	27-35	1.30-1.40	0.60-2.00	0.21-0.23	3.0-5.9	2.0-4.0	.37	---	3	7	38
	11-22	35-50	1.20-1.40	0.06-0.20	0.11-0.18	6.0-8.9	2.0-4.0	.32	---			
	22-32	35-50	1.20-1.40	0.06-0.20	0.11-0.18	6.0-8.9	1.0-3.0	.32	---			
	32-37	35-40	1.30-1.40	0.20-0.60	0.18-0.20	3.0-5.9	0.5-1.0	.43	---			
	37-41	---	---	0.01-0.06	---	---	---	---	---			
7069:												
Steinauer	0-6	27-32	1.20-1.35	0.20-0.60	0.19-0.22	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	6-15	27-32	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	15-41	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
	41-60	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
7078:												
Steinauer	0-6	27-32	1.20-1.35	0.20-0.60	0.19-0.22	3.0-5.9	0.5-2.0	.32	.32	5	4L	86
	6-15	27-32	1.30-1.50	0.20-0.60	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	15-41	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			
	41-60	24-35	1.30-1.65	0.20-0.60	0.16-0.19	3.0-5.9	0.0-0.5	.37	.37			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
8061:												
Wymore	0-5	27-40	1.30-1.50	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	5-9	30-45	1.30-1.50	0.06-0.20	0.13-0.23	3.0-8.9	1.0-2.0	.28	.28			
	9-17	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	1.0-2.0	.32	.32			
	17-25	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-32	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-40	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	40-53	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	53-80	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
8063:												
Wymore	0-5	27-40	1.30-1.50	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	5-9	30-45	1.30-1.50	0.06-0.20	0.13-0.23	3.0-8.9	1.0-2.0	.28	.28			
	9-17	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	1.0-2.0	.32	.32			
	17-25	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-32	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-40	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	40-53	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	53-80	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
8080:												
Wymore	0-5	27-40	1.30-1.50	0.20-0.60	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	5-9	30-45	1.30-1.50	0.06-0.20	0.13-0.23	3.0-8.9	1.0-2.0	.28	.28			
	9-17	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	1.5-2.0	.32	.32			
	17-25	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	25-32	42-55	1.30-1.50	0.01-0.06	0.11-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-40	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
	40-80	27-40	1.30-1.50	0.06-0.20	0.18-0.20	3.0-5.9	0.0-0.5	.43	.43			
9900:												
Arents, earthen dam.												
9980:												
Pits, quarry	0-60	---	---	---	0.00-0.00	---	---	---	---	-	---	0
9985:												
Pits, sand and gravel	0-60	0-8	1.70-2.00	6.00-20.00	0.02-0.09	0.0-2.9	0.0-0.5	.10	.17	2	8	0
9995:												
Waste water, sewage lagoon.												
9998:												
Water.												

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
1849:						
Burchard--------	0-13	15-25	5.6-7.3	0	0	0
	13-19	15-25	6.1-7.3	0	0	0
	19-29	15-25	7.4-8.4	5-10	0	0
	29-37	15-25	7.4-8.4	5-10	0	0
	37-60	10-20	7.4-8.4	1-15	0-2	0
1873:						
Burchard--------	0-13	15-25	5.6-7.3	0	0	0
	13-19	15-25	6.1-7.3	0	0	0
	19-29	15-25	7.4-8.4	5-10	0	0
	29-37	15-25	7.4-8.4	5-10	0	0
	37-60	10-20	7.4-8.4	1-15	0-2	0
Steinauer-------	0-6	15-25	7.4-8.4	5-10	0	0
	6-15	15-25	7.9-8.4	5-15	0	0
	15-41	15-25	7.9-8.4	5-15	0	0
	41-60	15-25	7.9-8.4	5-15	0	0
1879:						
Burchard--------	0-13	15-25	5.6-7.3	0	0	0
	13-19	15-25	6.1-7.3	0	0	0
	19-29	15-25	7.4-8.4	5-10	0	0
	29-37	15-25	7.4-8.4	5-10	0	0
	37-60	10-20	7.4-8.4	1-15	0-2	0
Steinauer-------	0-6	15-25	7.4-8.4	5-10	0	0
	6-15	15-25	7.9-8.4	5-15	0	0
	15-41	15-25	7.9-8.4	5-15	0	0
	41-60	15-25	7.9-8.4	5-15	0	0
1930:						
Butler----------	0-6	18-27	5.1-6.5	0	0	0
	6-10	18-27	5.1-6.5	0	0	0
	10-12	18-27	5.1-6.5	0	0	0
	12-25	30-40	5.6-7.8	0	0	0
	25-34	30-40	5.6-7.8	0	0	0
	34-43	20-35	6.6-8.4	0-5	0	0
	43-60	20-35	6.6-8.4	0-5	0	0
2076:						
Chase-----------	0-9	15-30	5.6-7.3	0	0	0
	9-19	15-30	5.6-7.3	0	0	0
	19-30	15-40	5.6-7.8	0	0	0
	30-41	15-40	5.6-7.8	0	0	0
	41-47	10-30	6.1-8.4	0-1	0	0
	47-80	10-30	6.1-8.4	0-1	0	0
2201:						
Cortland--------	0-6	10-30	4.5-6.0	0	0	0
	6-15	10-30	5.1-6.5	0	0	0
	15-28	10-30	5.1-6.5	0	0	0
	28-36	1.0-25	5.6-7.3	0	0	0
	36-40	1.0-25	5.6-7.3	0	0	0
	40-50	1.0-25	5.6-7.3	0	0	0
	50-80	1.0-25	5.6-7.3	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
2201:						
Malmo	0-6	25-31	5.6-6.5	0	0	0
	6-15	30-36	6.1-7.8	0-5	0	0
	15-25	30-36	6.1-7.8	0-5	0	0
	25-39	30-36	6.1-7.8	0-5	0	0
	39-43	27-37	7.4-7.8	1-5	0	0
	43-54	13-33	7.4-8.4	1-10	0	0
	54-80	13-33	7.4-8.4	1-10	0	0
2418:						
Deroin	0-7	20-35	5.6-6.5	0	0	0
	7-12	15-25	6.1-7.8	0-5	0	0
	12-18	15-25	6.1-7.8	0-5	0	0
	18-40	15-25	6.1-7.8	0-5	0	0
	40-50	10-20	6.1-7.8	0-5	0	0
	50-80	10-20	6.1-7.8	0-5	0	0
2420:						
Deroin	0-7	20-35	5.6-6.5	0	0	0
	7-12	15-25	6.1-7.8	0-5	0	0
	12-18	15-25	6.1-7.8	0-5	0	0
	18-40	15-25	6.1-7.8	0-5	0	0
	40-50	10-20	6.1-7.8	0-5	0	0
	50-80	10-20	6.1-7.8	0-5	0	0
2695:						
Edalgo	0-4	15-35	6.1-7.3	0	0	0
	4-8	15-35	6.1-7.3	0	0	0
	8-28	20-50	5.6-8.4	0	0	0
	28-40	---	---	0	0	0
2832:						
Filley	0-6	15-20	5.6-7.3	0	0	0
	6-12	15-20	5.6-7.3	0	0	0
	12-23	15-20	5.1-6.5	0	0	0
	23-30	15-20	5.1-6.5	0	0	0
	30-80	5.0-10	5.1-6.5	0	0	0
2833:						
Filley	0-6	15-20	5.6-7.3	0	0	0
	6-12	15-20	5.6-7.3	0	0	0
	12-23	15-20	5.1-6.5	0	0	0
	23-30	15-20	5.1-6.5	0	0	0
	30-80	5.0-10	5.1-6.5	0	0	0
2863:						
Fluvaquents	0-20	25-50	6.6-8.4	0-5	0	0.0-2.0
	20-80	---	---	---	---	---
3422:						
Hedville	0-10	5.0-18	5.6-7.3	0	0	0
	10-16	5.0-15	5.6-7.3	0	0	0
	16-22	---	---	---	---	---
4106:						
Judson	0-6	22-28	5.6-7.3	0	0	0
	6-12	22-28	5.6-7.3	0	0	0
	12-22	22-28	5.6-7.3	0	0	0
	22-31	22-28	5.6-7.3	0	0	0
	31-43	22-28	5.6-7.3	0	0	0
	43-54	22-28	6.1-7.8	0	0	0
	54-69	22-28	6.1-7.8	0	0	0
	69-80	22-28	6.1-7.8	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
4210:						
Kennebec	0-10	30-36	5.6-7.3	0	0	0.0-2.0
	10-19	30-36	5.6-7.3	0	0	0.0-2.0
	19-45	30-36	5.6-7.3	0	0	0.0-2.0
	45-56	30-36	6.1-7.3	0	0	0.0-2.0
	56-70	30-36	6.1-7.3	0	0	0.0-2.0
	70-80	30-36	6.1-7.3	0	0	0.0-2.0
4232:						
Kennebec	0-10	30-36	5.6-7.3	0	0	0.0-2.0
	10-19	30-36	5.6-7.3	0	0	0.0-2.0
	19-45	30-36	5.6-7.3	0	0	0.0-2.0
	45-56	30-36	6.1-7.3	0	0	0.0-2.0
	56-70	30-36	6.1-7.3	0	0	0.0-2.0
	70-80	30-36	6.1-7.3	0	0	0.0-2.0
4281:						
Kezan	0-6	18-30	6.6-7.8	0	0	0
	6-13	15-25	6.6-7.8	0	0	0
	13-19	15-25	6.6-8.4	0-10	0	0
	19-32	15-25	6.6-8.4	0-10	0	0
	32-44	15-25	6.6-8.4	0-10	0	0
	44-60	15-25	6.6-8.4	0-10	0	0
4287:						
Kezan	0-6	18-30	6.6-7.8	0	0	0
	6-13	15-25	6.6-7.8	0	0	0
	13-19	15-25	6.6-8.4	0-10	0	0
	19-32	15-25	6.6-8.4	0-10	0	0
	32-44	15-25	6.6-8.4	0-10	0	0
	44-60	15-25	6.6-8.4	0-10	0	0
4298:						
Kipson	0-9	20-30	7.4-8.4	10-20	0	0
	9-17	10-30	7.9-9.0	30-60	0	0
	17-36	---	---	---	---	---
Sogn	0-4	15-35	6.6-8.4	0-5	0	0
	4-8	15-35	6.6-8.4	0-5	0	0
	8-12	---	---	---	---	---
4300:						
Kipson	0-9	20-30	7.4-8.4	10-20	0	0
	9-17	10-30	7.9-9.0	30-60	0	0
	17-36	---	---	---	---	---
Sogn	0-4	15-35	6.6-8.4	0-5	0	0
	4-8	15-35	6.6-8.4	0-5	0	0
	8-12	---	---	---	---	---
Rock outcrop.						
4428:						
Lancaster	0-8	5.0-25	5.6-6.5	0	0	0
	8-12	5.0-25	5.6-6.5	0	0	0
	12-21	10-25	5.6-7.3	0	0	0
	21-33	5.0-15	6.1-7.3	0	0	0
	33-40	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
4429:						
Lancaster-------	0-8	5.0-25	5.6-6.5	0	0	0
	8-12	5.0-25	5.6-6.5	0	0	0
	12-21	10-25	5.6-7.3	0	0	0
	21-33	5.0-15	6.1-7.3	0	0	0
	33-40	---	---	---	---	---
4858:						
Malmo-----------	0-6	25-31	5.6-6.5	0	0	0
	6-15	30-36	6.1-7.8	0-5	0	0
	15-25	30-36	6.1-7.8	0-5	0	0
	25-39	30-36	6.1-7.8	0-5	0	0
	39-43	27-37	7.4-7.8	1-5	0	0
	43-54	13-33	7.4-8.4	1-10	0	0
	54-80	13-33	7.4-8.4	1-10	0	0
4864:						
Malmo-----------	0-6	25-31	5.6-6.5	0	0	0
	6-15	30-36	6.1-7.8	0-5	0	0
	15-25	30-36	6.1-7.8	0-5	0	0
	25-39	30-36	6.1-7.8	0-5	0	0
	39-43	27-37	7.4-7.8	1-5	0	0
	43-54	13-33	7.4-8.4	1-10	0	0
	54-80	13-33	7.4-8.4	1-10	0	0
Pawnee----------	0-6	20-30	5.6-7.3	0	0	0
	6-10	25-30	5.6-7.3	0	0	0
	10-14	25-30	5.6-7.3	0	0	0
	14-24	30-40	6.1-7.8	0	0	0
	24-32	30-40	6.1-7.8	0	0	0
	32-45	30-40	6.1-7.8	0	0	0
	45-53	15-30	6.1-7.8	0-5	0	0
	53-80	20-25	7.4-8.4	1-10	0	0
5397:						
Morrill---------	0-6	8.0-30	4.5-7.3	0	0	0
	6-12	10-30	5.1-7.3	0	0	0
	12-22	15-30	5.1-7.3	0	0	0
	22-30	15-30	5.1-7.3	0	0	0
	30-35	15-30	5.1-7.3	0	0	0
	35-43	15-30	5.1-7.3	0	0	0
	43-52	5.0-15	5.1-7.3	0	0	0
	52-59	4.0-25	5.1-7.3	0	0	0
	59-73	4.0-25	5.1-7.3	0	0	0
	73-80	4.0-25	5.1-7.3	0	0	0
5480:						
Muscotah--------	0-9	15-30	5.6-7.3	0	0	0
	9-16	15-30	5.6-7.3	0	0	0
	16-23	15-30	5.6-7.3	0	0	0
	23-35	20-40	5.6-7.3	0	0	0
	35-44	20-40	5.6-7.3	0	0	0
	44-60	20-40	5.6-7.3	0	0	0
	60-70	20-40	5.6-7.3	1-10	0	0
	70-80	20-40	5.6-7.3	0	0	0
5540:						
Nodaway---------	0-7	20-25	6.1-7.3	0	0	0.0-2.0
	7-14	20-25	6.1-7.3	0	0	0.0-2.0
	14-45	20-25	6.1-7.3	0	0	0.0-2.0
	45-60	20-25	6.1-7.3	0	0	0.0-2.0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
5541:						
Nodaway	0-7	20-25	6.1-7.3	0	0	0.0-2.0
	7-14	20-25	6.1-7.3	0	0	0.0-2.0
	14-45	20-25	6.1-7.3	0	0	0.0-2.0
	45-60	20-25	6.1-7.3	0	0	0.0-2.0
5970:						
Otoe	0-6	23-32	5.1-6.5	0	0	0
	6-15	30-46	5.6-7.3	0	0	0
	15-22	30-46	5.6-7.3	0	0	0
	22-32	30-46	5.6-7.3	0	0	0
	32-40	18-29	6.6-7.8	0	0	0
	40-50	18-29	6.6-7.8	0	0	0
	50-57	18-29	6.6-7.8	0	0	0
	57-80	16-33	6.6-7.8	0	0	0
6005:						
Padonia	0-11	15-35	6.1-7.3	0	0	0
	11-22	15-35	6.6-7.8	0	0	0
	22-32	15-35	7.4-8.4	1-10	0	0
	32-37	15-35	7.4-8.4	5-15	0	0
	37-41	---	---	---	---	---
7069:						
Steinauer	0-6	15-25	7.4-8.4	5-10	0	0
	6-15	15-25	7.9-8.4	5-15	0	0
	15-41	15-25	7.9-8.4	5-15	0	0
	41-60	15-25	7.9-8.4	5-15	0	0
7078:						
Steinauer	0-6	15-25	7.4-8.4	5-10	0	0
	6-15	15-25	7.9-8.4	5-15	0	0
	15-41	15-25	7.9-8.4	5-15	0	0
	41-60	15-25	7.9-8.4	5-15	0	0
8061:						
Wymore	0-5	23-32	5.6-6.5	0	0	0
	5-9	23-36	5.6-6.5	0	0	0
	9-17	30-42	5.6-7.3	0	0	0
	17-25	30-42	5.6-7.3	0	0	0
	25-32	30-42	5.6-7.3	0	0	0
	32-40	19-29	6.6-7.3	0-2	0	0
	40-53	19-29	6.6-7.3	0-2	0	0
	53-80	19-29	6.6-7.3	0-2	0	0
8063:						
Wymore	0-5	23-32	5.6-6.5	0	0	0
	5-9	23-36	5.6-6.5	0	0	0
	9-17	30-42	5.6-7.3	0	0	0
	17-25	30-42	5.6-7.3	0	0	0
	25-32	30-42	5.6-7.3	0	0	0
	32-40	19-29	6.6-7.3	0-2	0	0
	40-53	19-29	6.6-7.3	0-2	0	0
	53-80	19-29	6.6-7.3	0-2	0	0
8080:						
Wymore	0-5	23-32	5.6-6.5	0	0	0
	5-9	23-36	5.6-6.5	0	0	0
	9-17	30-42	5.6-7.3	0	0	0
	17-25	30-42	5.6-7.3	0	0	0
	25-32	30-42	5.6-7.3	0	0	0
	32-40	19-29	6.6-7.3	0-2	0	0
	40-80	19-29	6.6-7.3	0-2	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity
	In	meq/100g	pH	Pct	Pct	mmhos/cm
9900: Arents, earthen dam.						
9980: Pits, quarry.						
9985: Pits, sand and gravel.						
9995: Waste water, sewage lagoon.						
9998: Water.						

Table 19.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness		Uncoated steel	Concrete
	In					
1849:						
Burchard	---	---	---	Moderate	Moderate	Low
1873:						
Burchard	---	---	---	Moderate	Moderate	Low
Steinauer	---	---	---	Moderate	High	Low
1879:						
Burchard	---	---	---	Moderate	Moderate	Low
Steinauer	---	---	---	Moderate	High	Low
1930:						
Butler	---	---	---	High	High	Low
2076:						
Chase	---	---	---	High	High	Low
2201:						
Cortland	---	---	---	Moderate	Moderate	Moderate
Malmo	---	---	---	High	High	Low
2418:						
Deroin	---	---	---	High	Moderate	Moderate
2420:						
Deroin	---	---	---	High	Moderate	Moderate
2695:						
Edalgo	20-40	Bedrock (paralithic)	Moderately cemented	Moderate	Moderate	Low
2832:						
Filley	---	---	---	Moderate	Low	Moderate
2833:						
Filley	---	---	---	Moderate	Low	Moderate
2863:						
Fluvaquents	---	---	---	Moderate	High	Low
3422:						
Hedville	4-20	Bedrock (lithic)	Strongly cemented	Moderate	Low	Moderate
4106:						
Judson	---	---	---	High	Moderate	Low
4210:						
Kennebec	---	---	---	High	Moderate	Low
4232:						
Kennebec	---	---	---	High	Moderate	Low
4281:						
Kezan	80-80	---	---	High	High	Low
4287:						
Kezan	80-80	---	---	High	High	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness		Uncoated steel	Concrete
	In					
4298:						
Kipson	7-20	Bedrock (paralithic)	Moderately cemented	Moderate	Low	Low
Sogn	4-20	Bedrock (lithic)	Indurated	Moderate	Low	Low
4300:						
Kipson	7-20	Bedrock (paralithic)	Moderately cemented	Moderate	Low	Low
Sogn	4-20	Bedrock (lithic)	Indurated	Moderate	Low	Low
Rock outcrop	0-0	Bedrock (lithic)	Indurated	None	---	---
4428:						
Lancaster	20-40	Bedrock (paralithic)	Moderately cemented	Moderate	Low	Moderate
4429:						
Lancaster	20-40	Bedrock (paralithic)	Moderately cemented	Moderate	Low	Moderate
4858:						
Malmo	---	---	---	High	High	Low
4864:						
Malmo	---	---	---	High	High	Low
Pawnee	---	---	---	High	High	Low
5397:						
Morrill	---	---	---	Moderate	Moderate	Moderate
5480:						
Muscotah	---	---	---	Moderate	High	Low
5540:						
Nodaway	---	---	---	High	Moderate	Low
5541:						
Nodaway	---	---	---	High	Moderate	Low
5970:						
Otoe	---	---	---	High	High	Moderate
6005:						
Padonia	20-40	Bedrock (paralithic)	Weakly cemented	Moderate	High	Low
7069:						
Steinauer	---	---	---	Moderate	High	Low
7078:						
Steinauer	---	---	---	Moderate	High	Low
8061:						
Wymore	---	---	---	High	High	Moderate
8063:						
Wymore	---	---	---	High	High	Moderate
8080:						
Wymore	---	---	---	High	High	Moderate

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness		Uncoated steel	Concrete
	In					
9900: Arents, earthen dam.						
9980: Pits, quarry.						
9985: Pits, sand and gravel.						
9995: Waste water, sewage lagoon.						
9998: Water.						

Table 20.--Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1849:									
Burchard	B	---	---	---	---	---	---	---	---
1873:									
Burchard	B	---	---	---	---	---	---	---	---
Steinauer	B	---	---	---	---	---	---	---	---
1879:									
Burchard	B	---	---	---	---	---	---	---	---
Steinauer	B	---	---	---	---	---	---	---	---
1930:									
Butler	D								
		March	0.5-1.5	1.0-2.0	---	---	None	---	None
		April	0.5-1.5	1.0-2.0	---	---	None	---	None
		May	0.5-1.5	1.0-2.0	---	---	None	---	None
		June	0.5-1.5	1.0-2.0	---	---	None	---	None
		July	0.5-1.5	1.0-2.0	---	---	None	---	None
2076:									
Chase	C								
		February	2.0-4.0	>6.0	---	---	None	---	None
		March	2.0-4.0	>6.0	---	---	None	Very brief	Rare
		April	2.0-4.0	>6.0	---	---	None	Very brief	Rare
		May	2.0-4.0	>6.0	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
2201:									
Cortland	B	---	---	---	---	---	---	---	---
Malmo	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
		May	1.0-3.0	1.5-3.0	---	---	None	---	None
		June	1.0-3.0	1.5-3.0	---	---	None	---	None
2418:									
Deroin	B	---	---	---	---	---	---	---	---
2420:									
Deroin	B	---	---	---	---	---	---	---	---
2695:									
Edalgo	C	---	---	---	---	---	---	---	---
2832:									
Filley	B	---	---	---	---	---	---	---	---
2833:									
Filley	B	---	---	---	---	---	---	---	---

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
2863:									
Fluvaquents	D								
		January	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		February	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		March	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		April	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		May	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		June	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		July	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Occasional
		August	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Occasional
		September	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Occasional
		October	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Occasional
		November	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
		December	0.0	>6.0	0.0-2.0	Very long	Frequent	Brief	Frequent
3422:									
Hedville	D	---	---	---	---	---	---	---	---
4106:									
Judson	B	---	---	---	---	---	---	---	---
4210:									
Kennebec	B								
		January	3.5-5.0	>6.0	---	---	None	---	None
		February	3.5-5.0	>6.0	---	---	None	Brief	Rare
		March	3.5-5.0	>6.0	---	---	None	Brief	Rare
		April	3.5-5.0	>6.0	---	---	None	Brief	Rare
		May	3.5-5.0	>6.0	---	---	None	Brief	Rare
		June	3.5-5.0	>6.0	---	---	None	Brief	Rare
		July	3.5-5.0	>6.0	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		September	---	---	---	---	None	Brief	Rare
		October	---	---	---	---	None	Brief	Rare
		November	3.5-5.0	>6.0	---	---	None	---	None
		December	3.5-5.0	>6.0	---	---	None	---	None
4232:									
Kennebec	B								
		January	3.5-5.0	>6.0	---	---	None	---	None
		February	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		March	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		April	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		May	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		June	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		July	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	3.5-5.0	>6.0	---	---	None	Brief	Occasional
		December	3.5-5.0	>6.0	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
4281:									
Kezan	D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	---	None
		March	0.0-1.5	>6.0	---	---	None	Brief	Frequent
		April	0.0-1.5	>6.0	---	---	None	Brief	Frequent
		May	0.0-1.5	>6.0	---	---	None	Brief	Frequent
		June	0.0-1.5	>6.0	---	---	None	Brief	Frequent
		July	3.0-6.0	>6.0	---	---	None	Brief	Frequent
		August	3.0-6.0	>6.0	---	---	None	---	None
		September	3.0-6.0	>6.0	---	---	None	---	None
		October	3.0-6.0	>6.0	---	---	None	---	None
		November	0.0-1.5	>6.0	---	---	None	---	None
		December	0.0-1.5	>6.0	---	---	None	---	None
4287:									
Kezan	D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	---	None
		March	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		May	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		June	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		July	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		August	3.0-6.0	>6.0	---	---	None	---	None
		September	3.0-6.0	>6.0	---	---	None	---	None
		October	3.0-6.0	>6.0	---	---	None	---	None
		November	0.0-1.5	>6.0	---	---	None	---	None
		December	0.0-1.5	>6.0	---	---	None	---	None
4298:									
Kipson	D	---	---	---	---	---	---	---	---
Sogn	D	---	---	---	---	---	---	---	---
4300:									
Kipson	D	---	---	---	---	---	---	---	---
Sogn	D	---	---	---	---	---	---	---	---
Rock outcrop	D	---	---	---	---	---	---	---	---
4428:									
Lancaster	B	---	---	---	---	---	---	---	---
4429:									
Lancaster	B	---	---	---	---	---	---	---	---
4858:									
Malmo	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
		May	1.0-3.0	1.5-3.0	---	---	None	---	None
		June	1.0-3.0	1.5-3.0	---	---	None	---	None
4864:									
Malmo	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
		May	1.0-3.0	1.5-3.0	---	---	None	---	None
		June	1.0-3.0	1.5-3.0	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
4864:									
Pawnee	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
		May	1.0-3.0	1.5-3.0	---	---	None	---	None
5397:									
Morrill	B	---	---	---	---	---	---	---	---
5480:									
Muscotah	D								
		March	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		April	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		May	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		June	1.5-3.0	>6.0	---	---	None	Brief	Occasional
5540:									
Nodaway	B								
		February	---	---	---	---	None	Brief	Occasional
		March	---	---	---	---	None	Brief	Occasional
		April	3.0-5.0	>6.0	---	---	None	Brief	Occasional
		May	3.0-5.0	>6.0	---	---	None	Brief	Occasional
		June	3.0-5.0	>6.0	---	---	None	Brief	Occasional
		July	3.0-5.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	---	---	---	---	None	Brief	Occasional
5541:									
Nodaway	B								
		February	---	---	---	---	None	Brief	Frequent
		March	---	---	---	---	None	Brief	Frequent
		April	3.0-5.0	>6.0	---	---	None	Brief	Frequent
		May	3.0-5.0	>6.0	---	---	None	Brief	Frequent
		June	3.0-5.0	>6.0	---	---	None	Brief	Frequent
		July	3.0-5.0	>6.0	---	---	None	Brief	Frequent
		August	---	---	---	---	None	Brief	Frequent
		September	---	---	---	---	None	Brief	Frequent
		October	---	---	---	---	None	Brief	Frequent
		November	---	---	---	---	None	Brief	Frequent
5970:									
Otoe	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
6005:									
Padonia	C	---	---	---	---	---	---	---	---
7069:									
Steinauer	B	---	---	---	---	---	---	---	---
7078:									
Steinauer	B	---	---	---	---	---	---	---	---
8061:									
Wymore	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Soil saturation		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
8063:									
Wymore	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
8080:									
Wymore	D								
		March	1.0-3.0	1.5-3.0	---	---	None	---	None
		April	1.0-3.0	1.5-3.0	---	---	None	---	None
9900:									
Arents, earthen dam.									
9980:									
Pits, quarry.									
9985:									
Pits, sand and gravel.									
9995:									
Waste water, sewage lagoon.									
9998:									
Water.									

Table 21.--Classification of the Soils

Soil name	Family or higher taxonomic class
Burchard	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Butler	Fine, smectitic, mesic Vertic Argiaquolls
Chase	Fine, smectitic, mesic Aquertic Argiudolls
Cortland	Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs
Deroin	Fine-silty, mixed, superactive, mesic Mollic Hapludalfs
Edalgo	Fine, mixed, superactive, mesic Udic Argiustolls
Filley	Coarse-loamy, mixed, superactive, mesic Typic Hapludolls
Fluvaquents	Mesic Fluvaquents
Hedville	Loamy, mixed, superactive, mesic Lithic Haplustolls
Judson	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kennebec	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Kezan	Fine-silty, mixed, superactive, nonacid, mesic Mollic Fluvaquents
Kipson	Loamy, mixed, superactive, mesic, shallow Udorthentic Haplustolls
Lancaster	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Malmo	Fine, smectitic, mesic Aquertic Hapludalfs
Morrill	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Muscotah	Fine, smectitic, mesic Cumulic Hapludolls
Nodaway	Fine-silty, mixed, superactive, nonacid, mesic Mollic Udifluvents
Otoe	Fine, smectitic, mesic Aquertic Hapludalfs
Padonia	Fine, mixed, superactive, mesic Typic Argiudolls
Pawnee	Fine, smectitic, mesic Aquertic Argiudolls
Sogn	Loamy, mixed, superactive, mesic Lithic Haplustolls
Steinauer	Fine-loamy, mixed, superactive, calcareous, mesic Typic Udorthents
Wymore	Fine, smectitic, mesic Aquertic Argiudolls