United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the University of Nebraska, Conservation and Survey Division, and the Papio-Missouri River Natural Resources District

Soil Survey of Washington County, Nebraska

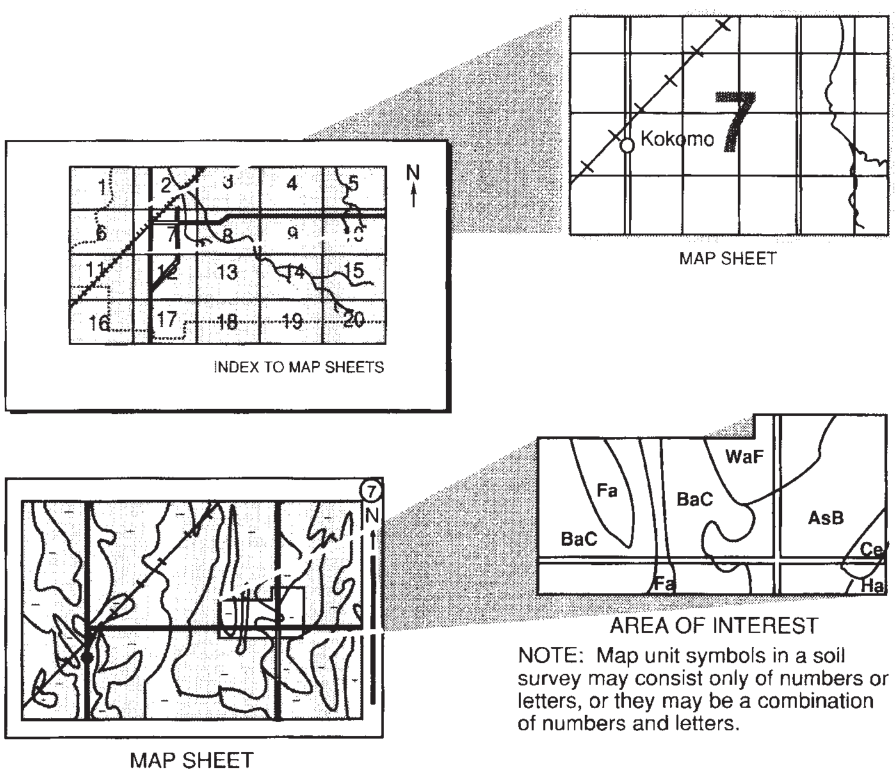
How To Use This Soil Survey

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 1996. 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; the University of Nebraska, Conservation and Survey Division; and the Papio-Missouri River Natural Resources District. The survey is part of the technical assistance furnished to the Papio-Missouri River Natural Resources District.

Cover: Tree-covered bluffs along the edge of the Missouri River flood plain.

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.

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Issued 2004

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, 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 home buyers 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.

Steven K. Chick
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Washington County, Nebraska

By Patrick T. Cowsert, Glenn A. Borchers, and Angela Schaecher

Fieldwork by Glenn Borchers and Melvin Lee, Natural Resources Conservation Service, and Steve Hartung, Josh Lear, and Cory Brubaker, 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, and the Papio-Missouri River Natural Resources District

WASHINGTON COUNTY is in east-central Nebraska (fig. 1). It has a land area of 394 square miles, or 252,295 acres. The physiography of the county consists of the Missouri River valley flood plain on the east; steep loess upland hills on the east that grade to rolling loess uplands to the west and north; and the flood plain of the Elkhorn River valley on the west. The eastern part of the county is in Major Land Resource Area (MLRA) 107, Iowa and Missouri Deep Loess Hills. The western part is in MLRA 102C, Loess Uplands. These MLRAs are in the Central Feed Grains and Livestock Region (USDA, 1981). The county is bordered by Burt County on the north, Dodge County and the Elkhorn River on the west, Douglas County on the south, and the Missouri River and Iowa on the east. Blair is the county seat and the largest community in the county.

Almost all of the land area in Washington County is agricultural; 93 percent of the land is farmland. About 84 percent is used as cropland, and 7 percent of the cropland is irrigated. Approximately 10 percent of the farmland is used for pasture or is wooded. Corn, soybeans, small grain, and alfalfa are the main crops. Grain crops and livestock production are the most important farm enterprises. Much of the grain is fed to livestock.

The Papio Soil and Water Conservation District, the first conservation district to be established in Nebraska, was organized in Washington County in the spring of 1938. It was named for Papillion Creek, which is often called Papio Creek. This creek is in the south-central part of the county. Personnel of the Soil

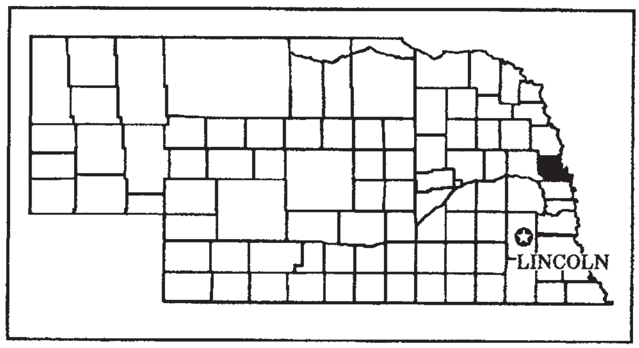

Figure 1.—Location of Washington County in Nebraska.

Conservation Service were assigned to the District in the summer of 1938 (USDA, 1964). In 1972, Soil and Water Conservation Districts were reorganized along hydrologic unit boundaries into 24 Natural Resource Districts (NRDs), at which time the Papio Soil and Water Conservation District became part of the Papio NRD. The Middle Missouri Tribes NRD and the Papio NRD merged in 1988 to form the Papio-Missouri River NRD.

This soil survey updates the survey of Washington County published in 1964 (USDA, 1964). Another earlier survey, which did not include the Missouri River flood plain, was completed in 1940. The survey of the flood plain was completed by the Nebraska Conservation and Survey Division in 1941. The Missouri River flood plain was completely flooded in 1952. Because of the flooding, the flood plain in the county was resurveyed in the spring of 1957 by the Soil Conservation Service.

General Nature of the County

This section provides some general information about Washington County. It describes early history; native vegetation; physiography, relief, and drainage; drainage districts; and climate.

Early History

Some of the earliest settlements in Nebraska were established in the area that is now Washington County. The earliest non-Native residents were hunters, trappers, explorers, and soldiers. On August 3, 1804, the explorers Lewis and Clark held a council with members of the Otoe and Missouria tribes near the present site of Fort Calhoun. This was the first formal meeting between the explorers and the people of the western tribes. The first steamboat to travel this far up the Missouri River landed in September 1819, near the site of Fort Calhoun. It carried troopers from the New Hampshire rifle regiment, who were sent out to establish the Fort Atkinson military post. This post was needed for the protection of settlers and was located on the bluffs along the Missouri River, east of the site of Fort Calhoun. At that time the river channel was at the base of the bluffs. After much flooding and engineering work in the valley, the river channel is now farther east than it was at the time the fort was established. This change in the river's course made a large area of the bottom land available for farming.

The present town of Fort Calhoun was the first permanent settlement in the county. Most of the settlers came from Iowa, Missouri, Illinois, Indiana, and Ohio. The vegetation during the time of early settlement was mainly native prairie, but trees were plentiful along streams and bluffs.

The first extensive farming in Nebraska took place in Washington County. In 1820 and 1821, soldiers stationed at Fort Atkinson cultivated several hundred acres on the terrace along the Missouri River. The corn and wheat that were produced were used at Fort Atkinson.

In 1855, the present boundaries of Washington County were established. The population was 207.

Native Vegetation

On the bottom land and bluffs near the Missouri and Elkhorn Rivers and their major tributaries, the native vegetation was deciduous trees. On the level and rolling uplands, it was tall prairie grass. The principal native trees were bur oak, red oak, ash, American plum, hackberry, and walnut. On the wetter sites and on the lower slopes, cottonwood and willow trees were most common.

The principal native grasses were big bluestem, switchgrass, and indiangrass. Little bluestem, sideoats grama, and prairie dropseed grew on the drier, steeper slopes. Prairie cordgrass, switchgrass, and gamagrass were some of the most common grasses in wet areas on bottom land.

Very little, if any, of the land in the county still has an undisturbed cover of grass or trees. Use and management of native areas of grasses and woodlands have changed the composition of the original native cover to varying degrees.

Physiography, Relief, and Drainage

There are two major physiographic divisions in Washington County. These are the uplands, which formed in loess and glacial till, and the flood plains, which formed in alluvium, along the Elkhorn and Missouri Rivers.

The Missouri River flood plain has two levels. The first level consists of the channel belt and meander belt areas, which are near the river. These areas are made up of recently deposited material and are characterized by a series of old oxbows and meander scars. This level is occasionally flooded and is commonly known as the low bottom or first bottom. The second level is the flood basin, which is between the uplands and the low bottom. This very level area consists of older sediments deposited in backwaters and is characterized by soils that have a thick, dark surface layer. It is subject to rare flooding and is commonly known as the high bottom or second bottom.

The low bottom is poorly drained and was flooded frequently before the large mainstream dams were built on the river. The high bottom is better drained and was seldom flooded. Recent channel work has stabilized the course of the river in places so that the present stream may go through some formerly high bottom areas.

The bottom land in the county is 100 to 300 feet below the uplands. The lowest elevation, approximately 1,000 feet above sea level, is along the Missouri River in the southeast corner of the county.

The uplands are part of a dissected plain that makes up eastern Nebraska. Bedrock of the Upper Pennsylvanian sediments underlies the extreme southeast corner of the county. Sandstone and shale of the Dakota Group (Lower Cretaceous) underlie the rest of the county. Over the bedrock is glacial till of

Nebraskan and Kansan age. This till is dominantly clay loam. It is exposed along the most deeply entrenched streams. Brown to reddish brown, silty to clayey material of Illinoian age covers the till surface in places. This paleosol ranges from 1 to several feet in thickness. It is known as Loveland loess.

More recent loess deposits mantle all of the uplands and stream terraces and in places are as much as 100 feet thick. The gray, calcareous Peorian loess that covers all of the uplands and stream terraces averages 40 feet in thickness. A discontinuous covering of younger, yellowish brown, slightly calcareous loess, 20 feet thick or more, occurs on wide interfluves and terraces along the Missouri River. The thickness of this material decreases toward the west. These recent loess deposits are thickest on the southern and eastern sides of interfluves and on level terraces and uplands.

The uplands can be divided into three parts: (1) the level upland divides in the central and western parts of the county and the level, loess-covered stream terraces along the Missouri River and Bell Creek; (2) the gently sloping to rolling uplands in the central part of the county; and (3) the rolling to steeply rolling uplands and bluffs in the eastern part of the county.

The uplands in the northwest corner of the county are about 1,320 feet above sea level. The county generally slopes to the southeast. Bell Creek is about 120 feet below the uplands, and Papillion Creek is 150 to 200 feet below the uplands. The Missouri River is about 300 feet below the upland divide that lies between it and Papillion Creek. Blair, on the Missouri River terrace, is 1,122 feet above sea level.

All of the drainage in the county flows directly or indirectly into the Missouri River. The Missouri River bottom land and the bluff area drain directly into the Missouri River. The central part of the county is drained by Papillion Creek, which flows into the Missouri River south of Omaha. The western part of the county is drained by the Elkhorn River and by Bell Creek, which flows into the Elkhorn River near the southwest corner of the county. The Elkhorn River flows into the Platte River, which flows into the Missouri River.

Drainage Districts

Washington County, like other counties that border the Missouri River, has had a number of drainage districts over the years. A board of directors was set up for each district to obtain easements and assess taxes for maintaining the system. Once the easements were obtained, the process of ditching new channels could begin. The new channels were straighter, deeper, and shorter than the existing natural drainage and were intended to lower the water table so that the production of row crops could be pursued. As the new channel cut deeper as a result of increased velocity and ability to carry a higher sediment load, the water table became lower. As a result, land that had formerly been of limited use was now more productive. Agricultural production came at a price in some areas, however, because the lowered grade of the newly downcut river channels caused the upland drainageways to degrade as they tried to meet the new level. This degradation caused accelerated gully headcutting and eventually began to threaten road bridges as the channels cut deeper. There was also a loss of native wetlands and the associated plant and animal species. Today the Natural Resources Conservation Service is trying to minimize these losses and is encouraging landowners to convert some of their property back to wetlands to enhance the environment and improve water quality.

History of Drainage Districts in Washington County

The oldest active drainage district in the county is the Burt-Washington Drainage District. Formed in 1914 and encompassing 67,559 acres, it runs from Decatur to Blair. The western edge of the district is approximately Highway 75, and the eastern edge is the Missouri River. In addition to the district itself, the system carries runoff from the uplands to the west; thus the system covers an area 1.3 times the size of the district. Two major leveed diversion ditches carry 72 percent of the water directly to the Missouri River.

The next oldest districts, both of which are now inactive, were the Petersen Bend Drainage District (formed in 1921) and the Papio Valley Drainage District #2 (formed in 1925). Both became inactive shortly after being formed. The Petersen was in the northeast corner of the county, and the Papio was along the Big Papillion Creek in the south-central part of the county (USDA, 1964).

The Bell Creek Drainage District was formed in 1946, and work was completed in 1947. The width of the drainage is 5 miles, and the total drainage length is 34 miles, 17 of which are in Washington County. The Calhoun Drainage District was formed in 1949. It serves the area of the Missouri River flood plain south and east of Forth Calhoun (Primrose, 1993).

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Blair 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 length of the growing season.

In winter, the average temperature is 23.5 degrees F and the average daily minimum temperature is 13.6 degrees. The lowest temperature on record, which occurred on February 2, 1996, is -24 degrees. In summer, the average temperature is 73.4 degrees and the average daily maximum temperature is 84.4 degrees. The highest recorded temperature, which occurred on July 13, 1995, is 108 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 (50 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 total annual precipitation is 29.90 inches. Of this total, 18.7 inches, or 63 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.92 inches on September 12, 1982. Thunderstorms occur on about 49 days each year, and most occur between May and September.

The average seasonal snowfall is 25.3 inches. The greatest snow depth at any one time during the period of record was 24 inches. On the average, 16 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 58 percent. Humidity is higher at night, and the average at dawn is about 78 percent. The sun shines 71 percent of the time possible in summer and 52 percent in winter. The prevailing wind is from the north from January through April and from the south during the rest of the year. Average windspeed is highest, more than 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.

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 and gives the principal hazards and limitations to be considered in planning for specific uses.

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, Monona silt loam, 2 to 5 percent slopes, eroded, is a phase of the Monona 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. Monona-Pohocco complex, 5 to 11 percent slopes, eroded, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Arents, earthen dams, is an example.

In the map unit descriptions, the abbreviation “LEP” stands for linear extensibility percent. Definitions of the ecological sites listed in the descriptions are available at local offices of the Natural Resources Conservation Service.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

1074—Albaton silty clay, drained, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Albaton: 87 percent
Minor components: 13 percent

Component Descriptions

Albaton

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 6.9 inches)
Shrink-swell potential: Very high (about 15.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: 0 to 18 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 3w
Land capability (nonirrigated): 3w

Typical profile:
Ap—0 to 7 inches; silty clay
Cg1—7 to 47 inches; clay
Cg2—47 to 65 inches; silty clay loam
2Cg3—65 to 80 inches; very fine sandy loam

Minor components

Onawa
Phase: Occasionally flooded
Extent: About 13 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. Corn, soybeans, small grain, and grasses and legumes for hay and pasture are the major crops in most years if adequate surface drainage is maintained.

1075—Albaton silty clay, depressional, 0 to 1 percent slopes, frequently flooded

Map Unit Composition

Albaton: 70 percent
Minor components: 30 percent

Component Descriptions

Albaton

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Oxbows on flood plains in river valleys
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 6.0 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Frequent
Ponding frequency: Frequent
Depth to seasonal water saturation: 0 to 12 inches
Surface runoff: Negligible
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (nonirrigated): 5w

Typical profile:
Ap—0 to 7 inches; silty clay
Cg—7 to 60 inches; clay

Minor components

Onawet
Phase: Depressional, frequently flooded
Extent: About 15 percent of the unit
Landform: Oxbow lakes on flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Haynie
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are used for pasture. In some years cultivated crops are grown.

1090—Alcester silt loam, 2 to 5 percent slopes

Map Unit Composition

Alcester: 90 percent
Minor components: 10 percent

Component Descriptions

Alcester

MLRA: 102C—Loess Uplands
Landform: Drainageways on uplands
Hillslope position: Footslopes
Parent material: Fine-silty colluvium
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.40 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
A—0 to 15 inches; silt loam
Bw1—15 to 34 inches; silt loam
Bw2—34 to 50 inches; silt loam
Bk—50 to 60 inches; silty clay loam

Minor components

Moody
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

1432—Belfore silty clay loam, 0 to 2 percent slopes

Map Unit Composition

Belfore: 80 percent
Minor components: 20 percent

Component Descriptions

Belfore

MLRA: 102C—Loess Uplands
Landform: Broad interstream divides on uplands
Hillslope position: Summits
Parent material: Clayey, noncalcareous loess
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Very slow (about 0.05 inch per hour)
Available water capacity: High (about 11.3 inches)
Shrink-swell potential: High (about 7.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
A—0 to 14 inches; silty clay loam
Bt—14 to 25 inches; silty clay
Bw—25 to 48 inches; silty clay loam
C—48 to 60 inches; silty clay loam

Minor components

Moody
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Filbert
Extent: About 10 percent of the unit
Landform: Open depressions on broad interstream divides in the uplands
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

1436—Belfore silty clay loam, terrace, 0 to 2 percent slopes

Map Unit Composition

Belfore: 85 percent
Minor components: 15 percent

Component Descriptions

Belfore

MLRA: 102C—Loess Uplands
Landform: Stream terraces in river valleys
Parent material: Clayey, noncalcareous loess
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Very slow (about 0.05 inch per hour)
Available water capacity: High (about 11.3 inches)
Shrink-swell potential: High (about 7.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
A—0 to 14 inches; silty clay loam
Bt—14 to 25 inches; silty clay
Bw—25 to 48 inches; silty clay loam
C—48 to 60 inches; silty clay loam

Minor components

Filbert
Extent: About 15 percent of the unit
Landform: Open depressions on stream terraces in river valleys
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

1594—Blyburg silty clay loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Blyburg: 85 percent
Minor components: 15 percent

Component Descriptions

Blyburg

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
A1—0 to 11 inches; silty clay loam
A2—11 to 15 inches; silt loam
C—15 to 60 inches; stratified silt loam

Minor components

Luton
Phase: Rarely flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Albaton
Phase: Occasionally 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: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

1859—Burchard clay loam, 6 to 12 percent slopes, eroded

Map Unit Composition

Burchard: 90 percent
Minor components: 10 percent

Component Descriptions

Burchard

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Hills 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 10.7 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
A—0 to 11 inches; clay loam
Bt—11 to 42 inches; clay loam
Btk—42 to 78 inches; clay loam
C—78 to 93 inches; clay loam

Minor components

Steinauer
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Hills on uplands
Slope: 6 to 12 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cropped, but some large areas are used for pasture. This soil is moderately suited to corn, soybeans, and small grain. It is well suited to grasses and legumes for hay and pasture.

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

Map Unit Composition

Burchard: 50 percent
Steinauer: 45 percent
Minor components: 5 percent

Component Descriptions

Burchard

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Hills 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 10.7 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
A—0 to 11 inches; clay loam
Bt—11 to 42 inches; clay loam
Btk—42 to 78 inches; clay loam
C—78 to 93 inches; clay loam

Steinauer

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Hills 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 11.0 inches)
Shrink-swell potential: Moderate (about 4.2 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: 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
C—15 to 60 inches; clay loam

Minor components

Ida
Phase: Eroded
Extent: About 5 percent of the unit
Landform: Loess hills on uplands
Slope: 17 to 30 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Some areas of this map unit are cropped, but large areas are used for pasture. These soils are moderately suited to corn, soybeans, and small grain. They are well suited to grasses and legumes for hay and pasture.

2030—Cass fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Cass: 90 percent
Minor components: 10 percent

Component Descriptions

Cass

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderately rapid (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.7 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Ponding: None
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 12 inches; fine sandy loam
AC—12 to 47 inches; fine sandy loam
C—47 to 60 inches; loamy fine sand

Minor components

Inglewood
Phase: Rarely flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain. It is well suited to grasses and legumes for hay and pasture.

2041—Cass loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Cass: 80 percent
Minor components: 20 percent

Component Descriptions

Cass

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 1.70 inches per hour)
Available water capacity: High (about 9.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 12 inches; loam
AC—12 to 47 inches; fine sandy loam
C—47 to 60 inches; loamy fine sand

Minor components

Shell
Phase: Occasionally flooded
Extent: About 20 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

2192—Cooper silty clay loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Cooper: 90 percent
Minor components: 10 percent

Component Descriptions

Cooper

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Fine-silty alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 8.9 inches)
Shrink-swell potential: Very high (about 10.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: About 18 to 30 inches
Runoff rate: Low

Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 16 inches; silty clay loam
Bg—16 to 24 inches; silty clay loam
2Ab—24 to 33 inches; silty clay
2Cg—33 to 60 inches; silty clay

Minor components

Blencoe
Phase: Rarely flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

2320—Crofton silt loam, 11 to 17 percent slopes, eroded

Map Unit Composition

Crofton: 85 percent
Minor components: 15 percent

Component Descriptions

Crofton

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 12.2 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Nora
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Moody
Phase: Eroded
Extent: About 5 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated or are used for pasture. This soil is poorly suited to corn, soybeans, and small grain. It is suited to grasses and legumes for hay and pasture.

2322—Crofton silt loam, 17 to 30 percent slopes, eroded

Map Unit Composition

Crofton: 85 percent
Minor components: 15 percent

Component Descriptions

Crofton

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 17 to 30 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 12.2 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Nora
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 17 to 30 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Steinauer
Phase: Eroded
Extent: About 5 percent of the unit
Landform: Hills on uplands
Slope: 12 to 30 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Most areas of this map unit are used for pasture. This soil is poorly suited to corn, soybeans, and small grain. It is well suited to grasses and legumes for hay and pasture.

2855—Fluvaquents, sandy, 0 to 1 percent slopes, frequently flooded

Map Unit Composition

Fluvaquents: 100 percent

Component Descriptions

Fluvaquents, sandy

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Slowest permeability: Rapid (about 6.00 inches per hour)
Available water capacity: Low (about 5.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Frequent
Depth to seasonal water saturation: 0 to 12 inches
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (nonirrigated): 8w

Typical profile:
A—0 to 5 inches; loamy sand
C1—5 to 60 inches; stratified loamy sand
C2—60 to 80 inches; stratified sand

General Considerations

• Most areas of this map unit are not cultivated or used for pasture. They provide habitat for some kinds of wildlife.

2863—Fluvaquents, silty, 0 to 1 percent slopes, frequently flooded

Map Unit Composition

Fluvaquents, silty: 100 percent

Component Descriptions

Fluvaquents, silty

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.4 inches)
Shrink-swell potential: Moderate (about 3.5 LEP)
Flooding frequency: Frequent
Depth to seasonal water saturation: 0 to 12 inches
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (nonirrigated): 8w

Typical profile:
A—0 to 5 inches; silty clay loam
C1—5 to 60 inches; stratified silt loam
C2—60 to 80 inches; stratified silt loam

General Considerations

• Most areas of this map unit are not cultivated or used for pasture. They provide habitat for some kinds of wildlife.

2890—Forney silt loam, overwash, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Forney: 85 percent
Minor components: 15 percent

Component Descriptions

Forney

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains and backswamps in river valleys
Parent material: Clayey alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 8.0 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: 0 to 18 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 8 inches; silt loam
Cg1—8 to 15 inches; silt loam
Cg2—15 to 19 inches; silty clay
2Ab—19 to 29 inches; silty clay
2Bgb—29 to 45 inches; silty clay
2Cg—45 to 60 inches; silty clay

Minor components

Moville
Phase: Rarely flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

3150—Grable silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Grable: 75 percent
Minor components: 25 percent

Component Descriptions

Grable

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Moderate (about 7.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 2s

Typical profile:
Ap—0 to 6 inches; silt loam
C1—6 to 23 inches; silt loam
2C2—23 to 60 inches; stratified fine sand

Minor components

Percival
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Haynie
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

3410—Haynie silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Haynie: 80 percent
Minor components: 20 percent

Component Descriptions

Haynie

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silt loam
C—7 to 60 inches; silt loam

Minor components

Grable
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

Albaton
Phase: Occasionally 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: Clayey Overflow; Veg. Zone 4

Onawa
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

3812—Ida silt loam, 5 to 11 percent slopes, eroded

Map Unit Composition

Ida: 90 percent
Minor components: 10 percent

Component Descriptions

Ida

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes, summits, and shoulders
Parent material: Calcareous loess
Slope: 5 to 11 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Limy Upland; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Pohocco
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

3822—Ida silt loam, 17 to 30 percent slopes, eroded

Map Unit Composition

Ida: 90 percent
Minor components: 10 percent

Component Descriptions

Ida

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 17 to 30 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Monona
Phase: Eroded

Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are used for pasture. This soil is poorly suited to corn, soybeans, and small grain. It is well suited to grasses and legumes for hay and pasture.

3892—Inglewood loamy fine sand, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Inglewood: 90 percent
Minor components: 10 percent

Component Descriptions

Inglewood

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Rapid (about 6.00 inches per hour)
Available water capacity: Low (about 4.5 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 36 to 72 inches
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 5 inches; loamy fine sand
C1—5 to 40 inches; stratified sand to fine sandy loam
C2—40 to 50 inches; fine sand
C3—50 to 80 inches; sand

Minor components

Platte
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

4112—Judson silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Judson: 80 percent
Minor components: 20 percent

Component Descriptions

Judson

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Hillslope position: Footslopes
Parent material: Fine-silty colluvium
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: Very high (about 12.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
A—0 to 30 inches; silty clay loam
AB—30 to 38 inches; silty clay loam
Bw—38 to 60 inches; silty clay loam
C—60 to 75 inches; silty clay loam

Minor components

Marshall
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Nodaway
Phase: Occasionally flooded
Extent: About 7 percent of the unit
Landform: Flood plains in river valleys; drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Lowland; Veg. Zone 4

Kezan
Phase: Occasionally flooded
Extent: About 3 percent of the unit
Landform: Drainageways on uplands; flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

4230—Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Kennebec: 85 percent
Minor components: 15 percent

Component Descriptions

Kennebec

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys; drainageways on uplands
Hillslope position: Toeslopes
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: High (about 11.9 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 36 to 72 inches
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A1—0 to 18 inches; silt loam
A2—18 to 41 inches; silt loam
AC—41 to 60 inches; silt loam

Minor components

Kezan
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys; drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

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

Map Unit Composition

Kezan: 70 percent
Minor components: 30 percent

Component Descriptions

Kezan

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys; drainageways on uplands
Hillslope position: Toeslopes
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: 0 to 18 inches
Runoff rate: High
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (nonirrigated): 4w

Typical profile:
Ap—0 to 6 inches; silt loam
C—6 to 13 inches; stratified silt loam
Cg—13 to 32 inches; stratified silt loam
Agb—32 to 60 inches; silt loam

Minor components

Nodaway
Phase: Occasionally flooded
Extent: About 20 percent of the unit
Landform: Drainageways on uplands; flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Lowland; Veg. Zone 4

Zook
Phase: Occasionally flooded
Extent: About 10 percent of the unit

Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are used for pasture. This soil is poorly suited to corn, soybeans, and small grain. It is well suited to grasses and legumes for hay and pasture.

4288—Kezan-Kennebec silt loams, drained, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Kezan: 35 percent
Kennebec: 35 percent
Minor components: 30 percent

Component Descriptions

Kezan

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys; drainageways on uplands
Hillslope position: Toeslopes
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 3w
Land capability (nonirrigated): 3w

Typical profile:
Ap—0 to 6 inches; silt loam
C—6 to 13 inches; stratified silt loam
Cg—13 to 32 inches; stratified silt loam
Agb—32 to 60 inches; silt loam

Kennebec

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys; drainageways on uplands
Hillslope position: Toeslopes
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: High (about 11.9 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 36 to 72 inches
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (nonirrigated): 2w

Typical profile:
A1—0 to 18 inches; silt loam
A2—18 to 41 inches; silt loam
AC—41 to 60 inches; silt loam

Minor components

Judson
Extent: About 15 percent of the unit
Landform: Drainageways on uplands
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

Zook
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. These soils are moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate drainage is maintained.

4780—Luton silty clay, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Luton: 75 percent
Minor components: 25 percent

Component Descriptions

Luton

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains and backswamps in river valleys
Parent material: Clayey alluvium

Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 6.5 inches)
Shrink-swell potential: Very high (about 14.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: 0 to 18 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 3w
Land capability (nonirrigated): 3w

Typical profile:
A—0 to 12 inches; silty clay
Bkg—12 to 24 inches; silty clay
Bkssyg—24 to 33 inches; silty clay
Bssyg—33 to 43 inches; silty clay
Bkyg—43 to 50 inches; silty clay
B´kg—50 to 60 inches; silty clay

Minor components

Tieville
Phase: Rarely flooded
Extent: About 15 percent of the unit
Landform: Flood plains and backswamps in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Forney
Phase: Rarely flooded
Extent: About 10 percent of the unit
Landform: Backswamps and flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

4956—Marshall silty clay loam, 0 to 2 percent slopes

Map Unit Composition

Marshall: 75 percent
Minor components: 25 percent

Component Descriptions

Marshall

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Broad interstream divides on uplands
Hillslope position: Summits
Parent material: Fine-silty, noncalcareous loess
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
Ap—0 to 7 inches; silty clay loam
A—7 to 18 inches; silty clay loam
Bw—18 to 47 inches; silty clay loam
C—47 to 68 inches; silty clay loam

Minor components

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

Pohocco
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

Corley
Extent: About 5 percent of the unit
Landform: Closed depressions on broad interstream divides in the uplands
Slope: 0 to 1 percent
Drainage class: Poorly drained
Ecological site: Silty Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

4961—Marshall silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Marshall: 90 percent
Minor components: 10 percent

Component Descriptions

Marshall

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders and summits
Parent material: Fine-silty, noncalcareous 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 11.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
Ap—0 to 7 inches; silty clay loam
A—7 to 18 inches; silty clay loam
Bw—18 to 47 inches; silty clay loam
C—47 to 68 inches; silty clay loam

Minor components

Pohocco
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated (fig. 2). This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

4974—Marshall-Pohocco silty clay loams, 5 to 11 percent slopes, eroded

Map Unit Composition

Marshall: 55 percent
Pohocco: 35 percent
Minor components: 10 percent

Component Descriptions

Marshall

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders, backslopes, and summits
Parent material: Fine-silty, noncalcareous 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 11.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 7 inches; silty clay loam
A—7 to 18 inches; silty clay loam
Bw—18 to 47 inches; silty clay loam
C—47 to 68 inches; silty clay loam

Pohocco

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes, summits, and shoulders
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 11.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 6 inches; silty clay loam
Bw—6 to 15 inches; silt loam
Bk—15 to 28 inches; silt loam
C—28 to 80 inches; silt loam

Minor components

Ida
Phase: Eroded

Figure 2.—A landscape in an area of Marshall soils in the central part of the county. Grassed waterways and riparian buffers are used to prevent the pollution of surface water by sedimentation.

Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. These soils are moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5321—Monona silt loam, 2 to 5 percent slopes, eroded

Map Unit Composition

Monona: 90 percent
Minor components: 10 percent

Component Descriptions

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills

Landform: Loess hills on uplands
Hillslope position: Shoulders and summits
Parent material: Fine-silty loess
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Minor components

Pohocco
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5343—Monona-Ida silt loams, 17 to 30 percent slopes, eroded

Map Unit Composition

Monona: 60 percent
Ida: 40 percent

Component Descriptions

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Fine-silty loess
Slope: 17 to 30 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Ida

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 17 to 30 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 6e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

General Considerations

• Most areas of this map unit are used for pasture or are wooded. These soils are poorly suited to corn, soybeans, and small grain. They are suited to grasses and legumes for hay and pasture.

5348—Monona-Pohocco complex, 5 to 11 percent slopes, eroded

Map Unit Composition

Monona: 55 percent
Pohocco: 35 percent
Minor components: 10 percent

Component Descriptions

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes, shoulders, and summits
Parent material: Fine-silty loess
Slope: 5 to 11 percent

Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Pohocco

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders, summits, and 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 11.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 6 inches; silty clay loam
Bw—6 to 15 inches; silt loam
Bk—15 to 28 inches; silt loam
C—28 to 80 inches; silt loam

Minor components

Ida
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated (fig. 3). These soils are moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5358—Moody silty clay loam, 2 to 5 percent slopes

Map Unit Composition

Moody: 90 percent
Minor components: 10 percent

Component Descriptions

Moody

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Summits and shoulders
Parent material: Fine-silty 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 11.7 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
A—0 to 17 inches; silty clay loam
Bw—17 to 62 inches; silty clay loam
Bk—62 to 70 inches; silt loam
C—70 to 98 inches; silt loam

Minor components

Nora
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5415—Moville silt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Moville: 85 percent
Minor components: 15 percent

Figure 3.—A landscape in an area of Monona and Pohocco soils in the eastern part of the county. Many areas are used for pasture or have been enrolled in the Conservation Reserve Program.

Component Descriptions

Moville

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Calcareous coarse-silty alluvium over clayey alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 8.8 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: About 36 to 72 inches
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 6 inches; silt loam
C—6 to 27 inches; stratified silt loam
2Ab—27 to 45 inches; silty clay
2Bb—45 to 60 inches; silty clay

Minor components

Luton
Phase: Rarely flooded
Extent: About 15 percent of the unit
Landform: Backswamps and flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5493—Napier-Nodaway-Gullied land complex, 0 to 60 percent slopes

Map Unit Composition

Napier: 40 percent
Nodaway: 30 percent
Gullied land: 30 percent

Component Descriptions

Napier

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Hillslope position: Footslopes
Parent material: Fine-silty colluvium
Slope: 5 to 11 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 12.4 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
A—0 to 29 inches; silt loam
Bw—29 to 48 inches; silt loam
C—48 to 65 inches; silt loam

Nodaway

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderately slow (about 0.40 inch per hour)
Available water capacity: High (about 11.4 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 36 to 72 inches
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (nonirrigated): 6w

Typical profile:
Ap—0 to 7 inches; silt loam
C—7 to 60 inches; stratified silt loam

Gullied land

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Parent material: Silty loess
Slope: 30 to 90 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.3 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Very high
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 7e

Typical profile:
A—0 to 6 inches; silt loam
C—6 to 60 inches; silt loam

General Considerations

• Where feasible, most areas of this map unit are cultivated. Other areas are wooded. In areas where cultivation is feasible, the soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5575—Nora silty clay loam, 5 to 11 percent slopes, eroded

Map Unit Composition

Nora: 85 percent
Minor components: 15 percent

Component Descriptions

Nora

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Backslopes, shoulders, and summits
Parent material: Fine-silty 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 11.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High

Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 4e
Land capability (nonirrigated): 3e

Typical profile:
Ap—0 to 9 inches; silty clay loam
Bw—9 to 22 inches; silty clay loam
Bk—22 to 54 inches; silt loam
C—54 to 80 inches; silt loam

Minor components

Crofton
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

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

General Considerations

• Most areas of this map unit are cultivated (fig. 4). This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5583—Nora-Crofton complex, 11 to 17 percent slopes, eroded

Map Unit Composition

Nora: 55 percent
Crofton: 35 percent
Minor components: 10 percent

Component Descriptions

Nora

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Fine-silty loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 9 inches; silty clay loam
Bw—9 to 22 inches; silty clay loam
Bk—22 to 54 inches; silt loam
C—54 to 80 inches; silt loam

Crofton

MLRA: 102C—Loess Uplands
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 12.2 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Moody
Phase: Eroded
Extent: About 10 percent of the unit
Landform: Loess hills on uplands
Slope: 5 to 11 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. These soils are poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5800—Omadi silt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Omadi: 75 percent
Minor components: 25 percent

Component Descriptions

Omadi

MLRA: 107—Iowa and Missouri Deep Loess Hills

Figure 4.—Grassed waterways and stripcropping in an area of Nora soils in the western part of the county.

Landform: Flood plains in river valleys
Parent material: Loamy alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderately slow (about 0.40 inch per hour)
Available water capacity: High (about 11.6 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: About 36 to 72 inches
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
A—0 to 12 inches; silt loam
AC—12 to 20 inches; stratified silt loam
C—20 to 80 inches; stratified silt loam

Minor components

Moville
Phase: Rarely flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Lowland; Veg. Zone 4

Blyburg
Phase: Rarely flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

- Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

5814—Onawa silty clay, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Onawa: 80 percent
Minor components: 20 percent

Component Descriptions

Onawa

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium over loamy alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.7 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silty clay
Cg1—7 to 22 inches; silty clay
2Cg2—22 to 60 inches; silt loam

Minor components

Albaton
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Haynie
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

Percival
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

5815—Onawa silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Onawa: 75 percent
Minor components: 25 percent

Component Descriptions

Onawa

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium over loamy alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 10.0 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silty clay loam
Cg1—7 to 22 inches; silty clay
2Cg2—22 to 60 inches; silt loam

Minor components

Grable
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

Haynie
Phase: Occasionally flooded
Extent: About 10 percent of the unit

Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

6075—Percival silty clay, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Percival: 75 percent
Minor components: 25 percent

Component Descriptions

Percival

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium over sandy alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Low (about 5.3 inches)
Shrink-swell potential: Very high (about 10.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 8 inches; silty clay
Cg1—8 to 24 inches; silty clay
2Cg2—24 to 60 inches; stratified fine sand to loamy fine sand

Minor components

Vore
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Ecological site: Silty Lowland; Veg. Zone 4

Albaton
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

6133—Platte loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Platte: 55 percent
Minor components: 45 percent

Component Descriptions

Platte

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys
Parent material: Loamy alluvium over sandy and gravelly alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Moderate (about 1.64 inches per hour)
Available water capacity: Low (about 4.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Surface runoff: Negligible
Ecological site: Subirrigated; Veg. Zone 4
Land capability (irrigated): 4w
Land capability (nonirrigated): 4w

Typical profile:
Ap—0 to 5 inches; loam
A—5 to 8 inches; very fine sandy loam
C—8 to 16 inches; very fine sandy loam
2Cg—16 to 80 inches; gravelly coarse sand

Minor components

Barney
Phase: Occasionally flooded
Extent: About 30 percent of the unit

Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained

Cass
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6164—Pohocco-Monona complex, 11 to 17 percent slopes, eroded

Map Unit Composition

Pohocco: 57 percent
Monona: 40 percent
Minor components: 3 percent

Component Descriptions

Pohocco

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders and backslopes
Parent material: Loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silty clay loam
Bw—6 to 15 inches; silt loam
Bk—15 to 28 inches; silt loam
C—28 to 80 inches; silt loam

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders and backslopes
Parent material: Fine-silty loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Minor components

Ida
Phase: Eroded
Extent: About 3 percent of the unit
Landform: Loess hills on uplands
Slope: 17 to 30 percent
Drainage class: Well drained
Ecological site: Limy Upland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. These soils are poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6178—Pohocco-Ida complex, 11 to 17 percent slopes, eroded

Map Unit Composition

Pohocco: 50 percent
Ida: 30 percent
Minor components: 20 percent

Component Descriptions

Pohocco

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Shoulders and backslopes
Parent material: Loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.5 inches)

Shrink-swell potential: Moderate (about 4.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: High
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silty clay loam
Bw—6 to 15 inches; silt loam
Bk—15 to 28 inches; silt loam
C—28 to 80 inches; silt loam

Ida

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Loess hills on uplands
Hillslope position: Backslopes
Parent material: Calcareous loess
Slope: 11 to 17 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Limy Upland; Veg. Zone 4
Land capability (nonirrigated): 4e

Typical profile:
Ap—0 to 6 inches; silt loam
AC—6 to 12 inches; silt loam
C—12 to 80 inches; silt loam

Minor components

Monona
Phase: Eroded
Extent: About 15 percent of the unit
Landform: Loess hills on uplands
Slope: 11 to 17 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

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

General Considerations

• Most areas of this map unit are cultivated. These soils are poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6490—Salix silty clay loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Salix: 80 percent
Minor components: 20 percent

Component Descriptions

Salix

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Silty alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderately slow (about 0.20 inch per hour)
Available water capacity: High (about 11.7 inches)
Shrink-swell potential: Moderate (about 5.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: About 36 to 72 inches
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
A—0 to 15 inches; silty clay loam
Bw1—15 to 25 inches; silty clay loam
Bw2—25 to 33 inches; silt loam
C—33 to 60 inches; silt loam

Minor components

Blyburg
Phase: Rarely flooded
Extent: About 20 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6660—Sarpy fine sand, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Sarpy: 90 percent
Minor components: 10 percent

Component Descriptions

Sarpy

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Excessively drained
Slowest permeability: Rapid (about 5.95 inches per hour)
Available water capacity: Low (about 4.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (irrigated): 3s
Land capability (nonirrigated): 4s

Typical profile:
Ap—0 to 6 inches; fine sand
C—6 to 60 inches; fine sand

Minor components

Wathena
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained

General Considerations

• Most areas of this map unit are cultivated. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6670—Sarpy loamy fine sand, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Sarpy: 75 percent
Minor components: 25 percent

Component Descriptions

Sarpy

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Excessively drained
Slowest permeability: Rapid (about 5.95 inches per hour)
Available water capacity: Low (about 4.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (irrigated): 3s
Land capability (nonirrigated): 4s

Typical profile:
Ap—0 to 6 inches; loamy fine sand
C—6 to 60 inches; fine sand

Minor components

Wathena
Phase: Occasionally flooded
Extent: About 25 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Moderately well drained

General Considerations

• Most areas of this map unit are cultivated. This soil is poorly suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

6906—Shell silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Shell: 95 percent
Minor components: 5 percent

Component Descriptions

Shell

MLRA: 102C—Loess Uplands
Landform: Flood plains in river valleys; drainageways on uplands
Hillslope position: Toeslopes
Parent material: Stratified silty alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderately slow (about 0.40 inch per hour)
Available water capacity: High (about 11.9 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Low
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 24 inches; silt loam

C1—24 to 33 inches; stratified silt loam
C2—33 to 60 inches; stratified silt loam

Minor components

Hobbs
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Drainageways on uplands; flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

8166—Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Zook: 80 percent
Minor components: 20 percent

Component Descriptions

Zook

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest permeability: Very slow (about 0.05 inch per hour)
Available water capacity: Moderate (about 8.9 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: 0 to 18 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (nonirrigated): 2w

Typical profile:
A—0 to 20 inches; silty clay loam
Bg—20 to 52 inches; silty clay
Cg—52 to 60 inches; silty clay

Minor components

Kezan
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys; drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Poorly drained

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

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

8503—Monona silt loam, bench, 0 to 2 percent slopes

Map Unit Composition

Monona: 85 percent
Minor components: 15 percent

Component Descriptions

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Stream terraces in river valleys
Parent material: Fine-silty loess
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 1
Land capability (nonirrigated): 1

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Minor components

Corley
Extent: About 15 percent of the unit
Landform: Closed depressions on stream terraces in river valleys
Slope: 0 to 1 percent

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

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

8504—Monona silt loam, bench, 2 to 5 percent slopes

Map Unit Composition

Monona: 80 percent
Minor components: 20 percent

Component Descriptions

Monona

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Stream terraces in river valleys
Parent material: Fine-silty loess
Slope: 2 to 5 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.8 inches)
Shrink-swell potential: Moderate (about 3.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Low
Ecological site: Silty; Veg. Zone 4
Land capability (irrigated): 3e
Land capability (nonirrigated): 2e

Typical profile:
Ap—0 to 7 inches; silt loam
A—7 to 15 inches; silt loam
Bw—15 to 30 inches; silt loam
C—30 to 60 inches; silt loam

Minor components

Marshall
Extent: About 20 percent of the unit
Landform: Stream terraces in river valleys
Slope: 2 to 5 percent
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. This soil is well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

8505—Fontanelle silty clay loam, depressional, 0 to 1 percent slopes, frequently flooded

Map Unit Composition

Fontanelle: 85 percent
Minor components: 15 percent

Component Descriptions

Fontanelle

MLRA: 102C—Loess Uplands
Landform: Oxbows 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 11.4 inches)
Shrink-swell potential: High (about 6.0 LEP)
Flooding frequency: Frequent
Ponding frequency: Frequent
Depth to seasonal water saturation: 0 to 12 inches
Surface runoff: Negligible
Ecological site: Subirrigated; Veg. Zone 4
Land capability (irrigated): 5w
Land capability (nonirrigated): 5w

Typical profile:
Ap—0 to 7 inches; silty clay loam
Bg—7 to 13 inches; silty clay loam
Cg1—13 to 22 inches; silt loam
2Cg2—22 to 41 inches; stratified fine sand to fine sandy loam to silt loam to silty clay loam
2Cg3—41 to 48 inches; stratified loam
3Ab—48 to 60 inches; silty clay loam
3Cg—60 to 80 inches; silt loam

Minor components

Barney
Phase: Frequently flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Poorly drained

General Considerations

• Most areas of this map unit are used for pasture. This soil is poorly suited to corn, soybeans, and small grain because of wetness. It is moderately suited to grasses and legumes for hay and pasture in some years.

8507—Onawet silty clay, depressional, 0 to 1 percent slopes, frequently flooded

Map Unit Composition

Onawet: 75 percent
Minor components: 25 percent

Component Descriptions

Onawet

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Oxbow lakes on flood plains in river valleys
Parent material: Clayey alluvium over loamy alluvium
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: Moderate (about 8.7 inches)
Shrink-swell potential: Very high (about 10.0 LEP)
Flooding frequency: Frequent
Ponding frequency: Frequent
Depth to seasonal water saturation: 0 to 12 inches
Surface runoff: Negligible
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (nonirrigated): 5w

Typical profile:
Ap—0 to 7 inches; silty clay
Cg1—7 to 24 inches; silty clay
2Cg2—24 to 39 inches; very fine sandy loam
2Cg3—39 to 56 inches; silt loam
3Cg4—56 to 80 inches; loamy fine sand

Minor components

Albaton
Phase: Depressional, frequently flooded
Extent: About 15 percent of the unit
Landform: Oxbows on flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Percival
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

General Considerations

• Most areas of this map unit are used for pasture, but some areas are cultivated. This soil is poorly suited to corn, soybeans, and small grain because of wetness. It is moderately suited to grasses and legumes for hay and pasture in some years.

8508—Onawa-Haynie complex, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Onawa: 50 percent
Haynie: 30 percent
Minor components: 20 percent

Component Descriptions

Onawa

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Clayey alluvium over loamy alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Slowest permeability: Very slow (about 0.01 inch per hour)
Available water capacity: High (about 9.7 inches)
Shrink-swell potential: Very high (about 12.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 18 to 36 inches
Runoff rate: High
Ecological site: Clayey Overflow; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silty clay
Cg1—7 to 22 inches; silty clay
2Cg2—22 to 60 inches; silt loam

Haynie

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Coarse-silty alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.95 inch per hour)
Available water capacity: High (about 11.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: More than 6 feet
Surface runoff: Negligible
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (irrigated): 2w
Land capability (nonirrigated): 2w

Typical profile:
Ap—0 to 7 inches; silt loam
C—7 to 60 inches; silt loam

Minor components

Percival
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Somewhat poorly drained
Ecological site: Clayey Overflow; Veg. Zone 4

Grable
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are cultivated. These soils are well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture in most years if adequate surface drainage is maintained.

8510—Wathena fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Composition

Wathena: 80 percent
Minor components: 20 percent

Component Descriptions

Wathena

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.7 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Occasional
Depth to seasonal water saturation: About 36 to 72 inches
Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (nonirrigated): 4w

Typical profile:
Ap—0 to 6 inches; fine sandy loam
AC—6 to 14 inches; loamy fine sand
C1—14 to 21 inches; fine sand
2C2—21 to 36 inches; stratified very fine sandy loam to silt loam
3C3—36 to 58 inches; stratified fine sand
3C4—58 to 69 inches; stratified very fine sandy loam

Minor components

Grable
Phase: Occasionally flooded
Extent: About 15 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 4

Sarpy
Phase: Occasionally flooded
Extent: About 5 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Excessively drained

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

8511—Wathena fine sandy loam, 0 to 2 percent slopes, rarely flooded

Map Unit Composition

Wathena: 80 percent
Minor components: 20 percent

Component Descriptions

Wathena

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Flood plains in river valleys
Parent material: Sandy alluvium
Slope: 0 to 2 percent
Drainage class: Moderately well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.7 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Flooding frequency: Rare
Depth to seasonal water saturation: About 36 to 72 inches

Surface runoff: Negligible
Ecological site: Sandy Lowland; Veg. Zone 4
Land capability (nonirrigated): 4w

Typical profile:
Ap—0 to 6 inches; fine sandy loam
AC—6 to 14 inches; loamy fine sand
C1—14 to 21 inches; fine sand
2C2—21 to 36 inches; stratified very fine sandy loam to silt loam
3C3—36 to 58 inches; stratified fine sand
3C4—58 to 69 inches; stratified very fine sandy loam

Minor components

Sarpy
Phase: Occasionally flooded
Extent: About 20 percent of the unit
Landform: Flood plains in river valleys
Slope: 0 to 2 percent
Drainage class: Excessively drained

General Considerations

• Most areas of this map unit are cultivated. This soil is moderately suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

8512—Gullied land-Napier complex, 5 to 60 percent slopes

Map Unit Composition

Gullied land: 50 percent
Napier: 40 percent
Minor components: 10 percent

Component Descriptions

Gullied land

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Parent material: Silty loess
Slope: 30 to 90 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: High (about 11.3 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Very high
Ecological site: Silty; Veg. Zone 4
Land capability (nonirrigated): 7e

Typical profile:
A—0 to 6 inches; silt loam
C—6 to 60 inches; silt loam

Napier

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Drainageways on uplands
Hillslope position: Footslopes
Parent material: Fine-silty colluvium
Slope: 5 to 11 percent
Drainage class: Well drained
Slowest permeability: Moderate (about 0.60 inch per hour)
Available water capacity: Very high (about 12.4 inches)
Shrink-swell potential: Low (about 2.0 LEP)
Depth to seasonal water saturation: More than 6 feet
Runoff rate: Medium
Ecological site: Silty Lowland; Veg. Zone 4
Land capability (nonirrigated): 3e

Typical profile:
A—0 to 29 inches; silt loam
Bw—29 to 48 inches; silt loam
C—48 to 65 inches; silt loam

Minor components

Kezan
Phase: Occasionally flooded
Extent: About 10 percent of the unit
Landform: Flood plains in river valleys; drainageways on uplands
Slope: 0 to 2 percent
Drainage class: Poorly drained
Ecological site: Silty Lowland; Veg. Zone 4

General Considerations

• Most areas of this map unit are not cultivated or used for pasture. They provide habitat for some kinds of wildlife.

9900—Arents, earthen dams

• This map unit consists of moved and manipulated soil material used for dams and water-control structures. The composition is variable, depending upon where the material was excavated. The properties of this soil material differ from those of natural soils.

Component Description

MLRA: 107—Iowa and Missouri Deep Loess Hills
Depth to seasonal water saturation: More than 6 feet

Runoff rate: High
Land capability (nonirrigated): 8

9980—Mine or Quarry

• This map unit consists of active and abandoned limestone quarries.

Component Description

MLRA: 107—Iowa and Missouri Deep Loess Hills
Depth to seasonal water saturation: More than 6 feet
Land capability (nonirrigated): 8s

9990—Aquolls

• This map unit consists of poorly drained soils within and adjacent to abandoned stream channels. Water is ponded for brief periods in areas of these soils. This map unit is generally not used for production agriculture.

Component Description

MLRA: 107—Iowa and Missouri Deep Loess Hills
Landform: Swales on flood plains in river valleys
Slope: 0 to 1 percent
Drainage class: Very poorly drained
Flooding frequency: None
Ponding frequency: Frequent
Seasonal water saturation: At the surface
Surface runoff: Negligible
Land capability (nonirrigated): 5w

9995—Miscellaneous water, sewage lagoon

Component Description

• This map unit consists of areas of water used as sewage lagoons.

9998—Water

Component Description

• This map unit consists of naturally occurring basins of surface water.

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 woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; 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, somewhat limited,* and *very limited.* The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair, poor,* and *very 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 estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

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.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area 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 also are 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.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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 5 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.

Land Capability Classification

Land capability classification 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 woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961).

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, woodland, 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, woodland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, woodland, 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, woodland, 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 acreage of soils in each capability class or subclass is shown in table 6. The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

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, woodland, 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.

About 122,825 acres in the survey area, or nearly 49 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most areas are in the eastern part of the county along the Missouri River flood plain and in the western and central parts of the county on the stable upland summits and in the drainageways.

The map units in the survey area that are considered prime farmland are listed in table 7. 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."

Native Woodland

Approximately 4.4 percent of the acreage in Washington County, or about 10,980 acres, is wooded or forested. The woodland occurs throughout the county as small, irregular tracts along streams, in the steeper upland areas in the eastern portion of the county, and on bluffs along the banks of the Missouri and Elkhorn Rivers. Some fairly large blocks of woodland are on the bottom land along the Missouri and Elkhorn Rivers. Although these wooded areas are capable of producing commercial wood products, their esthetic properties and their importance as wildlife habitat and watershed protection are of more value.

Black walnut, bur oak, eastern cottonwood, green ash, common hackberry, and silver maple are the trees most commonly used for wood products. Black willow, boxelder, American elm, slippery elm, honeylocust, northern catalpa, and red mulberry also grow in Washington County.

In many woodlots, the best trees have been cut for lumber, posts, poles, and firewood and the rest of the woodland is left standing in depleted condition. These woods can be improved if trees are protected from grazing, if undesirable trees or undesirable species are removed, and if inadequate stands are replanted.

Most of the soils in Washington County have good potential for the production of sawtimber, firewood, and other wood products, but most of these soils are used for crops and are unlikely to be converted to woodland. There are a few acres of Christmas trees and also some small conifers grown for transplanting and landscaping. The bottom land along streams can produce high-value wood products within a relatively short period of time, in contrast to production in the uplands. Small isolated areas that are difficult to farm are suitable for woodland.

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 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 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 9a and 9b 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 9a and 9b 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 10, 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, wheat, oats, and grain sorghum.

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 bluegrass, 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, wheatgrass, and grama.

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 bur oak, hackberry, hawthorn, and locust. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive, American plum, common chokecherry, and cotoneaster.

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 mountainmahogany, bitterbrush, snowberry, and big sagebrush.

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, saltgrass, cordgrass, rushes, sedges, and reeds.

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, shallow dugouts, ditches, 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, and red fox.

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, woodcock, thrushes, woodpeckers, squirrels, red fox, raccoon, deer, and songbirds.

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, marsh wrens, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include white-tailed deer, badger, 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, agricultural waste management, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

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 11a and 11b 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 12a and 12b 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.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 13a and 13b show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

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 agricultural waste management. *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).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

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.

Sand and *gravel* 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 likelihood 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 sand or gravel 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 bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. 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 layer 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. Embankments that have zoned construction (core and shell) are not considered. 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 particle-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.

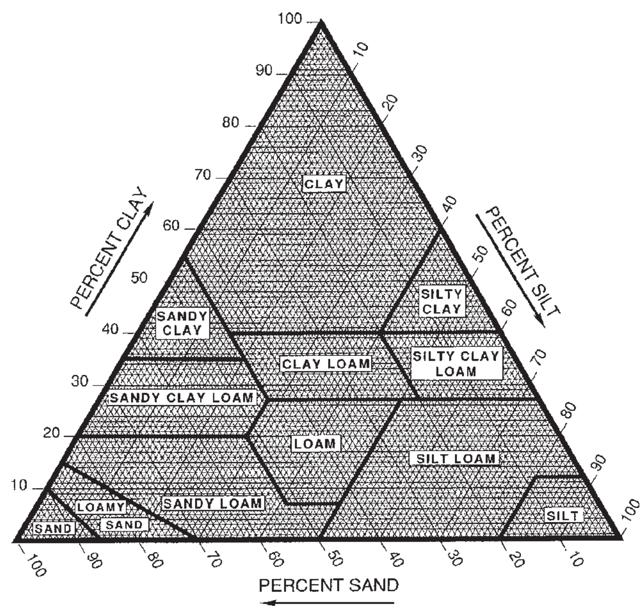

Figure 5.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

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. 5). "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, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

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.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 17, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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 content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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 factors are shown in table 17 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six 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 Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

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 rock 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.

Potential for 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table 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 Mollisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; 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 Hapludolls (*Hapl*, meaning minimal horizonation, plus *udoll*, the suborder of the Mollisols 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. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludolls.

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

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.

Aksarben Series

The Aksarben series consists of very deep, well drained soils on uplands. These soils formed in loess. Slopes range from 0 to 11 percent. Mean annual temperature is about 52 degrees F, and mean annual precipitation is about 29 inches.

Taxonomic classification: Fine, smectitic, mesic Typic Argiudolls

Typical Pedon

Aksarben silty clay loam, on a convex slope of 1 percent, in a cultivated area, about 6 miles south and 4 miles east of Wahoo, in Saunders County, Nebraska; 810 feet north and 1,875 feet west of the southeast corner of sec. 4, T. 13 N., R. 8 E.; USGS Wahoo Southeast topographic quadrangle; lat. 41 degrees 07 minutes 12 seconds N. and long. 96 degrees 31 minutes 39 seconds W. (Colors are for moist soil unless otherwise indicated.)

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

A—6 to 12 inches; very dark grayish brown (10YR 3/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable; many very fine and fine roots throughout; many fine and medium tubular pores; moderately acid; clear smooth boundary.

Bt1—12 to 18 inches; dark brown (10YR 3/3) silty clay loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure parting to strong fine subangular blocky; hard, firm; common fine roots throughout; common fine tubular pores; many faint very dark grayish brown (10YR 3/2) continuous clay films (cutans) on vertical and horizontal faces of peds; slightly acid; clear smooth boundary.

Bt2—18 to 26 inches; brown (10YR 4/3) silty clay loam, brown (10YR 5/3) dry; few fine faint dark yellowish brown (10YR 4/6) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); moderate coarse subangular blocky structure parting to strong fine and medium subangular blocky; hard, firm; few fine roots throughout; few fine tubular pores; many faint dark brown (10YR 3/3) continuous clay films (cutans) on vertical and horizontal faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt3—26 to 34 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; prominent strong brown (7.5YR 5/6) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); moderate coarse prismatic structure parting to strong medium subangular blocky; hard, firm; few very fine roots throughout; few very fine tubular pores; many faint dark brown (10YR 3/3) continuous clay films (cutans) on vertical and horizontal faces of peds; common fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt4—34 to 42 inches; brown (10YR 5/3) silty clay loam, pale brown (10YR 6/3) dry; prominent strong brown (7.5YR 5/6) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); strong coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; few very fine roots throughout; common very fine tubular pores; common distinct brown (10YR 4/3) discontinuous clay films (cutans) on vertical and horizontal faces of peds; common fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

BC—42 to 60 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; many coarse distinct yellowish brown (10YR 5/6) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; few very fine roots throughout; common fine tubular pores; common discontinuous pressure faces on vertical faces of peds; many fine and medium irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

C—60 to 80 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; many fine prominent strong brown (7.5YR 5/8) and common medium strong brown (7.5YR 5/6) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); massive; hard, friable; common fine tubular pores; discontinuous pressure faces on vertical faces of peds; many fine and medium irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Soil moisture regime: The soil moisture control section is udic.

Depth to the argillic horizon: 6 to 20 inches

Depth to redoximorphic concentrations: 12 to 36 inches; the mottling pattern is a relict feature and is not considered indicative of present drainage conditions.

Thickness of the mollic epipedon: 10 to 24 inches; the

mollic epipedon extends into the upper part of the Bt horizon.
Thickness of the solum: 30 to 72 inches
Reaction: Moderately acid or strongly acid in the most acid part of the solum
Texture of the particle-size control section (weighted average): Silty clay loam
Content of clay: 35 to 42 percent

A horizon:
Hue—10YR
Value—2 or 3 (3 or 4 dry)
Chroma—1 or 2 (moist and dry)
Texture—silty clay loam
Content of clay—27 to 35 percent
Reaction—slightly acid to strongly acid
Thickness—6 to 20 inches

Bt horizon:
Hue—10YR in the upper part; 10YR or 2.5Y in the lower part
Value—3 or 4 (4 or 5 dry) in the upper part; 4 to 6 (5 to 7 dry) in the lower part
Chroma—2 or 3 in the upper part (moist and dry); 2 to 4 in the lower part (moist and dry)
Redoximorphic features—relict redoximorphic concentrations with hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam or silty clay
Content of clay—35 to 42 percent
Reaction—slightly acid to strongly acid
Thickness—18 to 48 inches

BC horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (5 to 7 dry)
Chroma—2 to 4 (moist and dry)
Redoximorphic features—relict redoximorphic concentrations with hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam
Content of clay—27 to 35 percent
Reaction—slightly acid or moderately acid
Thickness—6 to 20 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (5 to 7 dry)
Chroma—2 to 4 (moist and dry)
Redoximorphic features—relict redoximorphic concentrations with hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5
Texture—silty clay loam or silt loam
Content of clay—24 to 35 percent
Reaction—neutral or slightly acid

Albaton Series

The Albaton series consists of very deep, poorly drained or very poorly drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 2 percent. Mean annual precipitation is about 31 inches, and mean annual temperature is about 50 degrees F.

Taxonomic classification: Very fine, smectitic, calcareous, mesic Vertic Fluvaquents

Typical Pedon

Albaton silty clay, on a nearly level flood plain, on a slope of 0.5 percent, in a cultivated field at an elevation of 988 feet above mean sea level; about 3 miles east of Fort Calhoun, in Washington County, Nebraska; 1,000 feet south and 250 feet west of the northeast corner of sec. 17, T. 17 N., R. 13 E.; USGS Loveland, Iowa-Nebraska, topographic quadrangle; lat. 41 degrees 26 minutes 53.95 seconds N. and long. 95 degrees 57 minutes 53.98 seconds E., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) (crushed) silty clay, grayish brown (10YR 5/2) (crushed) dry; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure parting to weak fine granular; firm, very hard; common very fine and fine roots throughout; slight effervescence (by HCl, unspecified); slightly alkaline; abrupt smooth boundary.

Cg1—7 to 13 inches; dark grayish brown (2.5Y 4/2) (crushed) silty clay, grayish brown (2.5Y 5/2) (crushed) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm, very hard; few very fine roots throughout; slight effervescence (by HCl, unspecified); moderately alkaline; clear smooth boundary.

Cg2—13 to 24 inches; dark grayish brown (2.5Y 4/2) (crushed) clay, grayish brown (2.5Y 5/2) (crushed) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; very firm, very hard; few very fine roots throughout; strong effervescence (by HCl, unspecified); moderately alkaline; clear smooth boundary.

Cg3—24 to 33 inches; dark grayish brown (2.5Y 4/2) (crushed) clay, grayish brown (2.5Y 5/2) (crushed) dry; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; very firm, very hard; strong effervescence (by HCl, unspecified); moderately alkaline; gradual smooth boundary.

Cg4—33 to 47 inches; olive gray (5Y 4/2) (crushed) clay, light olive gray (5Y 6/2) (crushed) dry; few fine prominent brown (7.5YR 4/4) and common coarse faint dark gray (5Y 4/1) mottles; massive; very firm, very hard; strong effervescence (by HCl, unspecified); moderately alkaline; abrupt smooth boundary.

Cg5—47 to 65 inches; dark grayish brown (2.5Y 4/2) (crushed) silty clay loam, light brownish gray (2.5Y 6/2) (crushed) dry; massive; very friable, soft; strong effervescence (by HCl, unspecified); moderately alkaline; clear smooth boundary.

2Cg6—65 to 80 inches; dark grayish brown (2.5Y 4/2) (crushed) very fine sandy loam, light brownish gray (2.5Y 6/2) (crushed) dry; massive; very friable, soft; strong effervescence (by HCl, unspecified); moderately alkaline.

Range in Characteristics

Soil moisture regime: Aquic
Mean annual soil temperature: 47 to 58 degrees F
Depth to redoximorphic concentrations: 6 to 12 inches
Color of redoximorphic features: Hue of 2.5Y, 5Y, 5YR, 7.5YR, or 10YR, value of 3 to 6, and chroma of 2 to 6
Thickness of the solum: 6 to 9 inches
Content of clay in the particle-size control section (weighted average): 50 to 60 percent
Content of sand in the particle-size control section (weighted average): 0 to 5 percent
Other features: The control section is calcareous, and most pedons are calcareous at or near the surface.

Ap horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—1 or 2
Texture—silty clay or clay; overwash phases have 10 to 20 inches of silt loam or silty clay loam with 22 to 40 percent clay
Content of clay—40 to 60 percent
Reaction—slightly alkaline
Thickness—6 to 9 inches

Cg horizon:
Hue—5Y, 2.5Y, or N
Value—4 or 5
Chroma—0 to 2
Other features—some pedons have strata with hue of 10YR or N, value of 2 or 3, and chroma of 0 or 1. These strata are less than 10 inches thick.
Texture—clay, silty clay, or silty clay loam; some pedons contain sandy materials below a depth of 60 inches
Content of clay—50 to 60 percent; some pedons have firm or very firm strata less than 6 inches thick with a higher or lower clay content (horizontal cleavage planes occur between the strata)
Reaction—moderately alkaline

Alcester Series

The Alcester series consists of very deep, well drained and moderately well drained soils on terraces, footslopes, and flood plains. These soils formed in silty colluvial-alluvial sediments. Slopes range from 0 to 25 percent. Mean annual precipitation is about 24 inches, and mean annual temperature is about 48 degrees F.

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

Typical Pedon

Alcester silt loam, on a northeast-facing slope of 2 percent in a cultivated field, about 1 mile south and 1/2 mile east of Alcester, in Union County, South Dakota; 270 feet south and 2,020 feet west of the northeast corner of sec. 34, T. 95 N., R. 49 W. When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

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

A—7 to 15 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak thick platy structure parting to weak coarse subangular blocky; slightly hard, very friable; neutral; gradual wavy boundary.

Bw1—15 to 24 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; crushing to very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable; neutral; gradual wavy boundary.

Bw2—24 to 34 inches; dark grayish brown (2.5Y 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; crushing to dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable; few darker wormcasts; neutral; gradual wavy boundary.

Bw3—34 to 42 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium subangular blocky structure; hard, friable; few darker wormcasts; neutral; gradual wavy boundary.

Bw4—42 to 50 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky; few fine distinct gray (5Y 5/1) (moist) redoximorphic depletions and prominent yellowish brown (10YR 5/6) (moist) redoximorphic concentrations; neutral; gradual wavy boundary.

Bk—50 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky; few fine distinct dark gray (5Y 4/1) (moist) redoximorphic depletions and prominent strong brown (7.5YR 5/6) (moist) redoximorphic concentrations; few fine and medium accumulations of carbonates; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic; the soil moisture control section is dry in all parts of the soil moisture control section 0 to 25 percent of the time when the soil temperature at 20 inches is 41 degrees F or higher in most years. It is moist in all parts for 70 to 89 days cumulative in most years.

Depth to secondary calcium carbonate: 36 to more than 60 inches

Thickness of the mollic epipedon: 24 to 60 inches; typically 36 inches

Thickness of the solum: 36 to more than 60 inches

Other features: Some pedons have clay or silty clay below a depth of 40 inches. Some pedons have a buried A horizon. Some pedons have recent lighter colored overwash.

Texture of the particle-size control section (weighted average): Silt loam or silty clay loam

Content of clay: 20 to 32 percent

A horizon:

Hue—10YR
Value—3 or 4 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—20 to 32 percent
Reaction—moderately acid to slightly alkaline
Thickness—12 to 24 inches

Bw horizon:

Hue—10YR or 2.5Y
Value—3 to 6 dry, 2 to 4 moist
Chroma—1 to 3
Texture—silt loam or silty clay loam
Content of clay—20 to 32 percent
Reaction—slightly acid to slightly alkaline
Thickness—25 to 70 inches

Bk horizon:

Hue—10YR or 2.5Y
Value—5 or 6 dry, 3 to 5 moist
Chroma—1 to 4
Texture—silty clay loam, silt loam, loam, or clay loam
Content of clay—20 to 32 percent
Calcium carbonate equivalent—0 to 10 percent
Reaction—slightly alkaline or moderately alkaline

C horizon (if it occurs):

Hue—10YR or 2.5Y
Value—5 or 6 dry, 3 to 5 moist
Chroma—1 to 4
Texture—silty clay loam, silt loam, loam, or clay loam
Content of clay—20 to 32 percent
Calcium carbonate equivalent—0 to 10 percent
Reaction—neutral to moderately alkaline

Barney Series

The Barney series consists of very deep, poorly drained and very poorly drained soils on flood plains along major streams. These soils formed in stratified loamy material deposited over sandy and gravelly alluvium. Permeability is rapid or very rapid below the loamy material. Slopes range from 0 to 2 percent. Mean annual temperature is about 51 degrees F, and mean annual precipitation is about 23 inches.

Taxonomic classification: Sandy, mixed, mesic Mollic Fluvaquents

Typical Pedon

Barney loam, on a slope of 0.5 percent, in an area of rangeland, about 2 miles south and 2 miles west of Verdigre, in Knox County, Nebraska; 500 feet south and 100 feet west of the northeast corner of sec. 24, T. 30 N., R. 7 W.; Verdigre topographic quadrangle; lat. 42 degrees 34 minutes 02 seconds N. and long. 98 degrees 04 minutes 18 seconds W. When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) moist; common fine distinct strong brown (7.5YR 5/6) (moist) iron accumulations in the matrix; weak thin platy structure; slightly hard, friable; few thin strata of fine sandy loam and loamy fine sand; strong effervescence; moderately alkaline; clear smooth boundary.

ACg—7 to 10 inches; gray (10YR 6/1) loam, dark gray (10YR 4/1) moist, common fine prominent strong brown (7.5YR 5/6) (moist) iron accumulations in the matrix; weak thin platy structure; slightly hard, friable; few thin strata of fine sandy loam and loamy fine sand; common fine and very fine roots; strong effervescence; moderately alkaline; clear smooth boundary.

Cg1—10 to 30 inches; light gray (10YR 7/2) fine sand, light brownish gray (10YR 6/2) moist; few fine prominent strong brown (7.5YR 5/6) (moist) iron accumulations in the matrix; single grain; loose; few very fine roots in the upper part; few thin strata of silt loam; moderately alkaline; clear smooth boundary.

Cg2—30 to 80 inches; light gray (10YR 7/2) coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose; 5 percent gravel by volume; moderately alkaline.

Range in Characteristics

Soil moisture regime: Aquic; the soil is generally saturated to or near the surface during most of the growing season.

Depth to secondary carbonates: 0 to 15 inches (if they occur)

Redoximorphic features: Common fine distinct and prominent brownish to yellowish brown iron masses

Depth to redoximorphic features: Near the surface of the soil to 80 inches below the surface

Depth to endosaturation: Poorly drained phase—from the surface to a depth of 18 inches; very poorly drained phase—from 6 inches above to 12 inches below the surface

Thickness of the mollic epipedon: 6 to 9 inches

Content of clay in the particle-size control section (weighted average): 3 to 10 percent

Content of sand in the particle-size control section (weighted average): 70 to 97 percent

Content of rock fragments: 0 to 25 percent (below a depth of 10 inches)

A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 (2 or 3 moist)
Chroma—1 or 2
Texture—silty clay loam, silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, fine sand, or sand; commonly stratified
Content of clay—5 to 35 percent
Reaction—neutral to moderately alkaline

ACg horizon:
Hue—10YR or 2.5Y
Value—4 to 6 (3 to 5 moist)
Chroma—1 or 2
Texture—silty clay loam, silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, fine sand, or sand
Content of clay—5 to 35 percent
Content of rock fragments—0 to 10 percent, by volume, rounded gravel 2 to 75 mm in diameter
Reaction—neutral to moderately alkaline

Cg1 horizon:
Hue—10YR or 2.5Y
Value—5 to 7 (4 to 6 moist)
Chroma—1 to 3
Texture—loamy fine sand, loamy sand, fine sand, or sand; strata of loamy material 1 to 5 inches thick; stratified loam, very fine sandy loam, fine sandy loam, or sandy loam in the upper few inches in some pedons
Content of clay—3 to 10 percent
Content of rock fragments—0 to 15 percent, by volume, rounded gravel 2 to 75 mm in diameter
Reaction—neutral to moderately alkaline

Cg2 horizon:
Hue—10YR or 2.5Y
Value—5 to 8 (4 to 7 moist)
Chroma—1 to 3
Texture—coarse sand, sand, gravelly coarse sand, or fine sand
Content of clay—0 to 5 percent
Content of rock fragments—0 to 25 percent, by volume, rounded gravel 2 to 75 mm in diameter
Reaction—neutral to moderately alkaline

Belfore Series

The Belfore series consists of very deep, well drained soils on uplands and stream terraces. These soils formed in loess. Slopes range from 0 to 4 percent. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 50 degrees F at the type location.

Taxonomic classification: Fine, smectitic, mesic Udic Haplustolls

Typical Pedon

Belfore silty clay loam, on a slope of less than 2 percent, in a cultivated field, about 8 miles north and 3 miles east of West Point, in Cuming County, Nebraska; 1,050 feet east and 100 feet north of the southwest corner of sec. 17, T. 23 N., R. 7 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; soft, friable; moderately acid; abrupt smooth boundary.

A—7 to 14 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable; moderately acid; clear smooth boundary.

Bt1—14 to 19 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, firm; moderately acid; clear smooth boundary.

Bt2—19 to 25 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; thin continuous coatings on faces of peds; slightly acid; clear smooth boundary.

Bw—25 to 39 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; few fine distinct yellowish brown (10YR 5/6) (moist) and light gray (10YR 7/2) (moist) mottles; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; thin continuous coatings on faces of peds; moderately acid; clear smooth boundary.

BC—39 to 48 inches; light olive brown (2.5Y 5/4) silty clay loam, olive brown (2.5Y 4/4) moist; few fine prominent yellowish brown (10YR 5/6) (moist) and light gray (10YR 7/2) (moist) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; slightly hard, friable; slightly acid; clear smooth boundary.

C1—48 to 55 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; few medium prominent yellowish brown (10YR 5/6) (moist) and light gray (10YR 7/2) (moist) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable; slightly acid; gradual wavy boundary.

C2—55 to 60 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; few medium prominent yellowish brown (10YR 5/6) (moist) and light gray (10YR 7/2) (moist) mottles; massive; slightly hard, friable; slightly acid.

Range in Characteristics

Soil moisture regime: Ustic bordering on udic
Depth to secondary calcium carbonate: 50 to more than 60 inches
Depth to the cambic horizon: 10 to 20 inches
Thickness of the solum: 33 to 60 inches
Thickness of the mollic epipedon: 10 to 20 inches
Texture of the particle-size control section (weighted average): Silty clay loam to silty clay
Content of clay: 35 to 43 percent

A horizon:
Hue—10YR
Value—3 or 4 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silty clay loam or silt loam
Content of clay—24 to 39 percent
Reaction—moderately acid to neutral
Thickness—10 to 20 inches

Bt horizon:
Hue—10YR
Value—4 to 6 dry, 4 or 5 moist
Chroma—2 or 3
Texture—silty clay or silty clay loam
Content of clay—35 to 43 percent
Reaction—moderately acid to neutral
Thickness—11 to 23 inches

Bw and BC horizons:
Hue—10YR or 2.5Y
Value—4 to 6 dry, 4 or 5 moist
Chroma—3 or 4
Color of redoximorphic features—hue of 10YR, value of 5 or 6, and chroma of 2 to 6; mottles are not indicative of present wetness conditions
Texture—silty clay loam or silt loam
Content of clay—35 to 43 percent
Reaction—moderately acid to neutral
Thickness—6 to 14 inches (Bw); 6 to 9 inches (BC)

C horizon:
Hue—10YR or 2.5Y
Value—6 or 7 dry, 5 or 6 moist
Chroma—2 to 4
Color of redoximorphic features—hue of 10YR, value of 5 or 6, and chroma of 2 to 6
Texture—silty clay loam or silt loam
Content of clay—25 to 35 percent
Reaction—slightly acid to slightly alkaline
Other features—fine, dark brown or black concretions in some pedons

Blencoe Series

The Blencoe series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in 20 to 40 inches of clayey alluvium and in the underlying silty alluvium. Slopes range from 0 to

2 percent. Mean annual air temperature is about 51 degrees F, and mean annual precipitation is about 29 inches.

Taxonomic classification: Clayey over loamy, smectitic, mesic Aquertic Hapludolls

Typical Pedon

Blencoe silty clay, on a slope of about 0.5 percent, on a flood plain in a cultivated field, about 5 miles north and 3 miles west of Hamburg, in Fremont County, Iowa; about 1,220 feet east and 1,840 feet south of the northwest corner of sec. 31, T. 68 N., R. 42 W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silty clay, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; firm; many roots; few fine pores; neutral; clear smooth boundary.

A—6 to 12 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; many roots; few fine pores; neutral; clear smooth boundary.

BA—12 to 18 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (2.5Y 5/2) dry; very dark gray (10YR 3/1) faces of peds; moderate fine subangular blocky structure; firm; black (10YR 2/1) organic stains on faces of peds; few fine roots; very few fine pores; neutral; clear smooth boundary.

Bg—18 to 28 inches; dark grayish brown (2.5Y 4/2) silty clay; weak medium prismatic structure parting to weak fine subangular blocky; firm; black (10YR 2/1) organic stains on faces of a few peds; many root channels; few black iron and manganese oxides; neutral; clear smooth boundary.

BCg—28 to 32 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium prismatic structure; friable; common root channels; few fine pores; few black iron and manganese oxides; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; neutral; clear smooth boundary.

2Cg—32 to 60 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; numerous roots and pores; few wormholes and wormcasts; distinct calcium carbonate threads; distinct calcium carbonate concretions; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 25 to 40 inches
Depth to the cambic horizon: 14 to 24 inches
Depth to redoximorphic concentrations: 25 to 40 inches
Thickness of the mollic epipedon: 14 to 24 inches
Depth to silty alluvium: 20 to 40 inches
Content of clay in the particle-size control section (weighted average): 40 to 52 percent in the upper part and 18 to 24 percent in the lower part
Content of sand in the particle-size control section (weighted average): 1 to 15 percent fine sand and sand coarser than fine sand in the upper part and 15 to 35 percent fine sand and sand coarser than fine sand in the lower part

A or Ap horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay or silty clay loam
Content of clay—38 to 55 percent
Content of sand—1 to 20 percent
Reaction—slightly acid or neutral

AB or BA horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 or 2
Texture—silty clay or silty clay loam
Content of clay—38 to 55 percent
Content of sand—1 to 20 percent
Reaction—slightly acid or neutral

Bg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay
Content of clay—43 to 50 percent
Content of sand—1 to 10 percent
Calcium carbonate equivalent—0 to 32 percent
Reaction—neutral

BC or BCg horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam or silty clay
Content of clay—35 to 50 percent
Content of sand—1 to 20 percent
Calcium carbonate equivalent—0 to 20 percent
Reaction—neutral or slightly alkaline

2Cg horizon:
Hue—10YR or 2.5Y
Value—5
Chroma—2
Texture—silt loam
Content of clay—18 to 24 percent

Content of sand—15 to 35 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline to strongly alkaline

Blyburg Series

The Blyburg series consists of very deep, well drained soils on flood plains. These soils formed in weakly stratified loamy alluvium. Slopes range from 0 to 6 percent. Mean annual precipitation is about 26 inches, and mean annual temperature is about 50 degrees F.

Taxonomic classification: Coarse-silty, mixed, superactive, mesic Fluventic Hapludolls

Typical Pedon

Blyburg silt loam, in a cultivated field, 3 miles west and 1 1/2 miles north of Dakota City, in Dakota County, Nebraska; 400 feet west and 180 feet north of the southeast corner of sec. 2, T. 28 N., R. 8 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium and fine granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.
A1—7 to 11 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak medium and fine granular; slightly hard, very friable; neutral; gradual smooth boundary.
A2—11 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak medium and fine granular; slightly hard, very friable; few fine pores; disseminated lime throughout; strongly effervescent; moderately alkaline; clear smooth boundary.
C1—15 to 21 inches; dark grayish brown (10YR 4/2), stratified silt loam, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure parting to weak fine subangular blocky; slightly hard, very friable; many fine pores; disseminated lime throughout; strongly effervescent; moderately alkaline; clear wavy boundary.
C2—21 to 60 inches; dark grayish brown (10YR 4/2), stratified silt loam, grayish brown (2.5Y 5/2) dry; massive; soft, very friable; many fine pores; 6 percent calcium carbonate; disseminated lime throughout; violently effervescent; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: 5 to 20 inches
Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: 10 to 20 inches
Texture of the particle-size control section (weighted average): Silt loam or very fine sandy loam
Content of clay: 8 to 15 percent
Content of sand: Less than 15 percent

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silt loam, silty clay loam, or very fine sandy loam
Reaction—neutral to moderately alkaline
Thickness—10 to 20 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture—silt loam or very fine sandy loam
Reaction—slightly alkaline or moderately alkaline

Burchard Series

The Burchard series consists of very deep, well drained soils on uplands. These soils formed in calcareous glacial till. Slopes range from 2 to 30 percent. Mean annual precipitation is about 30 inches, and 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 (fig. 6), on a southwest-facing slope of 11 percent, in an area of pasture, at an elevation of 1,250 feet above mean sea level; about 2 miles south and 5 miles west of Herman, in Washington County, Nebraska; 1,050 feet east and 175 feet south of the northwest corner of sec. 9, T. 19 N., R. 10 E.; USGS Nickerson Northeast topographic quadrangle; lat. 41 degrees 38 minutes 22 seconds N. and long. 96 degrees 18 minutes 20 seconds W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

A—0 to 5 inches; very dark grayish brown (10YR 3/2) (crushed) clay loam, dark gray (10YR 4/1) (crushed) dry; moderate fine granular structure; friable, slightly hard; many very fine and fine roots throughout; many fine tubular pores; slightly acid; clear smooth boundary.

BAt—5 to 11 inches; 30 percent dark grayish brown (10YR 4/2) (crushed) and 70 percent very dark grayish brown (10YR 3/2) (crushed) clay loam, 30 percent yellowish brown (10YR 5/4) (crushed) and 70 percent black (10YR 2/1) (crushed) dry; moderate medium subangular blocky structure; firm, hard; common very fine and fine roots throughout; common fine tubular pores; few patchy faint dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; slightly acid; clear smooth boundary.

Bt1—11 to 22 inches; dark grayish brown (10YR 4/2) (crushed) clay loam, light brownish gray (10YR 6/2) (crushed) dry; few fine prominent yellowish red (5YR 5/8) and common fine faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; very firm, very hard; common very fine and fine roots throughout; common fine tubular pores; common discontinuous faint dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common fine spherical black (10YR 2/1) iron-manganese masses throughout; cracks filled with very dark grayish brown (10YR 3/2) material extend through the horizon from top to bottom (cracks are approximately 5 mm by 3 cm); neutral; clear smooth boundary.

Bt2—22 to 34 inches; grayish brown (10YR 5/2) (crushed) clay loam, light brownish gray (10YR 6/2) (crushed) dry; common fine prominent yellowish red (5YR 5/8) and common medium distinct strong brown (7.5YR 4/6) and common fine faint light brownish gray (2.5Y 6/2) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; very firm, very hard; few very fine and fine roots throughout; common fine tubular pores; continuous distinct dark grayish brown (2.5Y 4/2) slickensides (pedogenic) and common discontinuous faint grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common fine spherical black (10YR 2/1) iron-manganese masses throughout; cracks filled with very dark grayish brown (10YR 3/2) material extend through the horizon from top to bottom (cracks are approximately 2 to 3 mm by 0.5 to 1.5 cm); neutral; gradual smooth boundary.

Bt3—34 to 42 inches; light brownish gray (2.5Y 6/2) (crushed) clay loam, light gray (2.5Y 7/2) (crushed) dry; common medium prominent strong brown (7.5YR 4/6) and common fine faint light gray (2.5Y 7/2) mottles; moderate coarse prismatic structure parting to weak coarse angular blocky; very firm, very hard; few very fine and fine roots throughout; common fine tubular pores; discontinuous distinct grayish brown (2.5Y 5/2) slickensides (pedogenic) and common continuous faint grayish brown (10YR 5/2) clay films on faces of peds and in pores; common medium irregular black (10YR 2/1) iron-manganese masses throughout; common rounded mixed rock fragments 2 to 75 mm in diameter; remnants of material filling cracks extend down into the upper 2 or 3 inches of the horizon; neutral; gradual wavy boundary.

Btk—42 to 65 inches; light brownish gray (2.5Y 6/2) (crushed) clay loam, light gray (2.5Y 7/2) (crushed) dry; common medium prominent strong brown (7.5YR 4/6) and many medium faint light gray (2.5Y 7/2) mottles; weak coarse prismatic structure; firm, hard; few very fine roots throughout; common fine tubular pores; common continuous faint grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common medium irregular black (10YR 2/1) iron-manganese masses throughout; common coarse irregular weakly cemented carbonate concretions throughout; 2 percent rounded mixed rock fragments 2 to 75 mm in diameter; violent effervescence (by HCl, unspecified); moderately alkaline; gradual wavy boundary.

BC—65 to 78 inches; light brownish gray (2.5Y 6/2) (crushed) clay loam, light gray (2.5Y 7/2) (crushed) dry; common medium prominent yellowish red (5YR 5/8), common medium faint light gray (2.5Y 7/2), and common medium prominent strong brown (7.5YR 4/6) mottles; weak coarse prismatic structure; firm, hard; few very fine roots throughout; common fine tubular pores; discontinuous distinct grayish brown (2.5Y 5/2) slickensides (pedogenic) and few patchy faint grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; many fine irregular black (10YR 2/1) iron-manganese masses throughout; 6 percent rounded mixed rock fragments 2 to 75 mm in diameter; moderately alkaline; gradual wavy boundary.

C—78 to 93 inches; pale brown (10YR 6/3) (crushed) clay loam, very pale brown (10YR 7/3) (crushed) dry; common medium distinct light brownish gray (2.5Y 6/2) and many coarse prominent strong brown (7.5YR 5/6) mottles; massive; firm, hard; few very fine roots throughout; common fine tubular pores; common medium threadlike black (10YR 2/1) iron-manganese masses throughout; common coarse irregular carbonate concretions throughout and few very coarse irregular carbonate concretions throughout; 8 percent rounded mixed rock fragments 75 to 250 mm in diameter; violent effervescence (by HCl, unspecified); moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 51 to 56 degrees F
Depth to the argillic horizon: 8 to 18 inches
Depth to secondary calcium carbonate: 12 to 30 inches
Depth to redoximorphic concentrations: 22 to 80 inches (if they occur)
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 sand and coarser
Content of rock fragments: 1 to 10 percent gravel by volume

A horizon:
Hue—10YR
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
Thickness—8 to 18 inches

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 to 6
Texture—clay loam
Content of clay—dominantly 27 to 35 percent; ranges to 38 percent in some pedons
Reaction—slightly acid or neutral
Thickness—4 to 24 inches

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
Thickness—10 to 30 inches

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
Thickness—0 to 15 inches

C horizon:
Hue—10YR 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

Cass Series

The Cass series consists of deep, well drained soils on bottom land. These soils formed in mixed sandy and loamy alluvium. Slopes range from 0 to 3 percent. Mean annual temperature is about 53 degrees F, and mean annual precipitation is about 23 inches.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Fluventic Haplustolls

Typical Pedon

Cass fine sandy loam, on a southeast-facing slope of 1 percent, in a cultivated field, about 7 miles north of Doniphan, in Hall County, Nebraska; about 1,300 feet east and 700 feet south of the northwest corner of sec. 17, T. 10 N., R. 9 W. When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
A—7 to 12 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; gradual smooth boundary.
AC—12 to 20 inches; gray (10YR 5/1) fine sandy loam, dark gray (10YR 4/1) moist; weak coarse prismatic structure; soft; very friable; slightly acid; gradual smooth boundary.
C1—20 to 47 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; soft, very friable; neutral; diffuse wavy boundary.
C2—47 to 60 inches; very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; single grain; loose; neutral.

Range in Characteristics

Soil moisture regime: Ustic

Depth to secondary calcium carbonate: More than 60 inches; strata of free carbonates below a depth of 25 inches in some pedons
Thickness of the mollic epipedon: 10 to 20 inches
Content of clay in the particle-size control section (weighted average): 2 to 10 percent
Other features: A loamy substratum phase and a clayey substratum phase are recognized.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—fine sandy loam, loam, silt loam, or very fine sandy loam
Content of clay—8 to 20 percent
Reaction—moderately acid to neutral
Thickness—4 to 11 inches

C horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—fine sandy loam or sandy loam in the upper part and loamy fine sand, fine sand, or coarse sand in the lower part; strata of coarser material are common, and strata of silty clay loam or mixed sand and gravel are common below a depth of 40 inches
Content of clay—5 to 15 percent in the upper part and 2 to 10 percent in the lower part
Reaction—slightly acid to moderately alkaline

Cooper Series

The Cooper series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in 20 to 30 inches of silty alluvium and in the underlying clayey alluvium. Slopes range from 0 to 2 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 29 inches.

Taxonomic classification: Fine-silty over clayey, mixed, superactive, mesic Fluvaquentic Hapludolls

Typical Pedon

Cooper silty clay loam, on a slope of about 1 percent, in a cultivated field on a flood plain, at an elevation of 975 feet above mean sea level; about 4 miles south and 2 miles east of Council Bluffs, in Pottawattamie County, Iowa; about 150 feet south and 2,100 feet east of the northwest corner of sec. 32, T. 74 N., R. 43 W.; USGS Council Bluffs South quadrangle; lat. 41 degrees 10 minutes 26 seconds N. and long. 95 degrees 48 minutes 55 seconds W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky and granular structure; friable; neutral; gradual smooth boundary.
A—8 to 16 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; neutral; gradual smooth boundary.
Bg—16 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; friable; slightly alkaline; abrupt smooth boundary.
2Ab—24 to 33 inches; very dark gray (10YR 3/1) silty clay; strong fine subangular blocky structure; very firm; few calcium carbonate concretions; slightly effervescent; moderately alkaline; gradual smooth boundary.
2Cg—33 to 60 inches; olive gray (5Y 4/2) silty clay; olive gray (5Y 5/2) coatings on faces of some peds; massive with vertical cleavage; very firm; many calcium carbonate concretions; few fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 20 to 40 inches
Depth to the cambic horizon: 10 to 20 inches
Depth to clayey alluvium: 20 to 30 inches
Thickness of the cambic horizon: 6 to 30 inches
Content of clay in the upper two-thirds of the particle-size control section (weighted average): 27 to 34 percent
Content of clay in the lower one-third of the particle-size control section (weighted average): 40 to 60 percent
Content of sand in the particle-size control section (weighted average): 1 to 15 percent fine sand and sand coarser than fine sand
Other features: Some pedons have a 3Cg horizon below a depth of 60 inches. This horizon is silty clay loam or silt loam.

Ap horizon:
Hue—10YR
Value—2
Chroma—1 or 2
Texture—silty clay loam, silt loam, or loam
Content of clay—24 to 34 percent
Content of sand—10 to 35 percent

Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline

A horizon:
Hue—10YR
Value—2
Chroma—1 to 3
Texture—silty clay loam
Content of clay—27 to 34 percent
Content of sand—10 to 20 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline

BA horizon (if it occurs):
Hue—10YR or 2.5Y
Value—3
Chroma—2
Texture—silty clay loam
Content of clay—27 to 34 percent
Content of sand—10 to 20 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—neutral or slightly alkaline

Bg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay loam
Content of clay—27 to 34 percent
Content of sand—10 to 20 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—neutral or slightly alkaline

2Ab horizon:
Hue—10YR to 5Y
Value—3
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—1 to 10 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—slightly alkaline or moderately alkaline

2Bg, 2Bkg, or 2BCg horizon (if it occurs):
Hue—10YR to 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—1 to 10 percent
Calcium carbonate equivalent—5 to 25 percent
Reaction—slightly alkaline or moderately alkaline

2Cg horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Content of sand—1 to 10 percent
Calcium carbonate equivalent—5 to 25 percent
Reaction—slightly alkaline or moderately alkaline

Corley Series

The Corley series consists of very deep, poorly drained, moderately permeable soils in depressions on uplands and high stream benches. These soils formed in loess. Slopes range from 0 to 2 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 29 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Argiaquic Argialbolls

Typical Pedon

Corley silt loam, on a concave slope of less than 1 percent, in a cultivated field, at an elevation of 1,000 feet above mean sea level; about 2 miles east and 1 mile south of Malvern, in Mills County, Iowa; about 1,750 feet east and 300 feet north of the southwest corner of sec. 34, T. 72 N., R. 41 W.; USGS Tabor Northeast quadrangle; lat. 40 degrees 59 minutes 24 seconds N. and long. 95 degrees 33 minutes 09 seconds W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; strongly acid; clear smooth boundary.

A—10 to 18 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure parting to weak fine granular; friable; strongly acid; clear smooth boundary.

E—18 to 29 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 7/1) dry; weak thick platy structure; friable; strongly acid; clear smooth boundary.

Bt—29 to 36 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Btg1—36 to 47 inches; dark gray (5Y 4/1) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; many distinct clay films on faces of peds; dark stains along root channels; moderately acid; gradual smooth boundary.

Btg2—47 to 60 inches; dark gray (5Y 4/1) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; many distinct clay films on faces of peds; dark organic stains along root channels; few fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; slightly acid; gradual smooth boundary.

Cg—60 to 68 inches; olive gray (5Y 5/2) silt loam; massive; friable; few fine prominent light olive brown (2.5Y 5/6) redoximorphic concentrations; neutral.

Range in Characteristics

Depth to the argillic horizon: 14 to 32 inches
Depth to carbonates: More than 60 inches
Content of clay in the particle-size control section (weighted average): 26 to 32 percent
Content of sand in the particle-size control section (weighted average): Less than 5 percent fine sand and sand coarser than fine sand
Other features: Some pedons have a BCg horizon.

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silt loam
Content of clay—20 to 27 percent
Content of sand—5 percent or less
Reaction—strongly acid to neutral

E horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Texture—silt loam
Content of clay—20 to 24 percent
Content of sand—5 percent or less
Reaction—strongly acid to neutral

Bt horizon:
Hue—10YR, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silt loam or silty clay loam
Content of clay—27 to 32 percent
Content of sand—5 percent or less
Reaction—strongly acid to slightly acid

Btg horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam
Content of clay—28 to 32 percent; as much as 34 percent in thin subhorizons
Content of sand—5 percent or less
Reaction—strongly acid to slightly acid

Cg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—24 to 28 percent
Content of sand—5 percent or less
Reaction—moderately acid to neutral

Crofton Series

The Crofton series consists of very deep, well drained soils on uplands. These soils formed in calcareous loess. Slopes range from 1 to 60 percent. Mean annual temperature is 51 degrees F, and mean annual precipitation is 28 inches.

Taxonomic classification: Fine-silty, mixed, superactive, calcareous, mesic Typic Ustorthents

Typical Pedon

Crofton silt loam, on convex, east-facing slope of about 14 percent, about 2$^{1}/_{2}$ miles south and 5 miles east of Emerson, in Thurston County, Nebraska; about 650 feet north and 100 feet east of the southwest corner of sec. 9, T. 26 N., R. 7 E. When described, the soil was dry 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 and very fine granular structure; soft, friable; few fine and medium lime concretions; violently effervescent; moderately alkaline; abrupt smooth boundary.

AC—6 to 12 inches; brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable; many medium lime concretions; violently effervescent; moderately alkaline; clear wavy boundary.

C1—12 to 20 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure; slightly hard, friable; common medium distinct reddish brown (5YR 5/4) (moist) iron masses in the matrix (the iron accumulations are relict redoximorphic features); many medium lime concretions; violently effervescent; moderately alkaline; clear wavy boundary.

C2—20 to 60 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable; few fine distinct reddish brown (5YR 5/4) (moist) iron masses in the soil matrix (the iron accumulations are relict redoximorphic features); few fine and medium lime concretions and some disseminated lime; violently effervescent; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic bordering on udic
Mean annual soil temperature: 45 to 52 degrees F
Depth to secondary calcium carbonate: 3 to 15 inches
Thickness of the solum: 3 to 15 inches
Content of clay in the particle-size control section (weighted average): 15 to 27 percent

A horizon:
Hue—10YR
Value—4 to 6 dry, 3 or 4 moist
Chroma—2 or 3
Texture—silt loam
Content of clay—20 to 27 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—3 to 6 inches

AC horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4
Texture—silt loam
Content of clay 15 to 27 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—0 to 9 inches

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4
Texture—silt loam
Content of clay—15 to 27 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline

Filbert Series

The Filbert series consists of very deep, somewhat poorly drained soils in open depressions on stream terraces. These soils formed in loess. Slopes are 0 to 1 percent. Mean annual precipitation is about 28 inches, and mean annual temperature is about 51 degrees F at the type location.

Taxonomic classification: Fine, smectitic, mesic Vertic Argialbolls

Typical Pedon

Filbert silt loam, on a concave slope of less than 1 percent, in an area of cropland, 2 miles east and 4 miles north of Wahoo, in Saunders County, Nebraska; about 1,875 feet west and 350 feet north of the southeast corner of sec. 13, T. 15 N., R. 7 E.; USGS Colon Southwest, Nebraska, topographic quadrangle; lat. 41 degrees 14 minutes 52 seconds N. and long. 96 degrees 34 minutes 12 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap1—0 to 5 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable, slightly hard; common coarse, medium, and fine roots throughout; strongly acid; abrupt smooth boundary.

Ap2—5 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak thick platy and weak thin platy structure parting to weak fine granular; friable, slightly hard; common fine and medium roots throughout; very strongly acid; abrupt smooth boundary.

E1—7 to 12 inches; very dark gray (10YR 3/1) silt loam, 50 percent gray (10YR 5/1) and 50 percent gray (10YR 6/1) dry; moderate thin platy structure parting to weak thin platy; friable, soft; common fine and medium roots throughout; common fine tubular pores; few fine distinct dark yellowish brown (10YR 4/6) friable masses of iron accumulations with sharp boundaries on faces of peds; strongly acid; clear wavy boundary.

E2—12 to 15 inches; dark gray (10YR 4/1) silt loam, 20 percent gray (10YR 6/1) and 80 percent light gray (10YR 7/1) dry; weak thin platy structure parting to weak fine subangular blocky; friable, slightly hard; common fine and medium roots throughout; many fine tubular pores; slightly acid; abrupt wavy boundary.

Bt1—15 to 25 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; common fine roots between peds; many distinct continuous clay films on faces of peds; many fine rounded soft masses of iron-manganese and common fine rounded iron-manganese concretions; neutral; gradual wavy boundary.

Bt2—25 to 36 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; few fine roots between peds; many distinct continuous clay films on faces of peds; many fine rounded soft masses of iron-manganese and common fine rounded iron-manganese concretions; neutral; gradual wavy boundary.

Bt3—36 to 43 inches; very dark gray (10YR 3/1) silty clay, grayish brown (2.5Y 5/2) dry; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; few very fine roots between peds; many distinct continuous clay films on faces of peds; many fine rounded soft masses of iron-manganese and fine rounded iron-manganese concretions; slightly alkaline; gradual wavy boundary.

Bt4—43 to 53 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (2.5Y 5/2) dry; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; few very fine roots between peds; many distinct continuous clay films on faces of peds; common fine rounded soft masses of iron-manganese; slightly alkaline; gradual wavy boundary.

Bt5—53 to 62 inches; very dark grayish brown (10YR 3/2) silty clay, grayish brown (2.5Y 5/2) dry; strong coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; many distinct continuous clay films on faces of peds; common fine rounded soft masses of iron-manganese; few medium distinct grayish brown (2.5Y 5/2) iron depletions on surfaces of peds; slightly alkaline; gradual wavy boundary.

Bt6—62 to 80 inches; 15 percent very dark grayish brown (2.5Y 3/2) and 85 percent olive gray (5Y 5/2) and dark gray (5Y 4/1) silty clay loam, light brownish gray (2.5Y 6/2) dry; moderate coarse prismatic structure parting to strong medium subangular blocky; very firm, very hard; many distinct continuous clay films on faces of peds and few distinct continuous black stains in root channels and/or pores; fine irregular soft masses of iron-manganese; few fine prominent dark yellowish brown (10YR 4/6) friable masses of iron accumulation with sharp boundaries on faces of peds; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is dry in all parts for 80 out of the 120 days following the summer solstice in 2 years out of 10.

Depth to base of the argillic horizon: 60 to more than 80 inches

Thickness of the solum: 60 to more than 80 inches

Thickness of the mollic epipedon: 6 to 14 inches; the mollic epipedon extends into the B horizon

Texture of the particle-size control section (weighted average): Silty clay

Content of clay: 45 to 55 percent

Content of sand: Less than 10 percent

A horizon:
Hue—10YR
Value—2 or 3 moist, 4 or 5 dry
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—18 to 27 percent
Reaction—moderately acid to very strongly acid
Thickness—6 to 14 inches

E horizon:
Hue—10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1
Texture—silt loam
Content of clay—14 to 20 percent
Reaction—slightly acid to strongly acid
Thickness—3 to 12 inches
Structure—platy or granular

Bt horizon:
Hue—10YR, 2.5Y, or N (upper part); 10YR to 5Y (lower part)
Value—2 to 4 moist, 3 to 6 dry
Chroma—0 to 2
Texture—silty clay or clay in the upper part and silty clay loam or silty clay in the lower part
Content of clay—45 to 55 percent in the upper part and 35 to 45 percent in the lower part
Reaction—slightly acid to slightly alkaline
Thickness—40 to 80 inches

BC horizon (if it occurs):
Hue—10YR to 5Y
Value—3 to 6 moist, 5 to 8 dry
Chroma—1 to 3
Texture—silty clay loam or silt loam
Content of clay—18 to 35 percent
Reaction—neutral to moderately alkaline
Thickness—5 to 18 inches

C horizon (if it occurs):
Hue—10YR to 5Y
Value—4 to 7 moist, 5 to 8 dry
Chroma—2 to 4
Texture—silt loam or silty clay loam
Content of clay—18 to 35 percent
Reaction—neutral to moderately alkaline

Fontanelle Series

The Fontanelle series consists of deep, very poorly drained soils in ephemeral oxbow lakes on flood plains. These soils formed in silty alluvium. Slopes range from 0 to 2 percent. Mean annual temperature is 51 degrees F, and mean annual precipitation is 29 inches.

Taxonomic classification: Coarse-silty, mixed, superactive, mesic Fluvaquentic Endoaquolls

Typical Pedon

Fontanelle silty clay loam, on a slope of less than 1 percent, in a cultivated area on a nearly level flood plain, at an elevation of 1,155 feet above mean sea level; south of Arlington, in Washington County, Nebraska; about 2,300 feet west and 1,100 feet south of the northeast corner of sec. 13, T. 17 N., R. 9 E.; USGS Arlington, Nebraska, topographic quadrangle; lat. 41 degrees 26 minutes 54.3 seconds N. and long. 96 degrees 21 minutes 23.3 seconds W., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; friable; many fine and medium roots throughout and few medium and coarse roots throughout; common very fine and fine moderate-continuity tubular pores; neutral; clear smooth boundary.

Bg—7 to 13 inches; 60 percent black (10YR 2/1) and 40 percent very dark gray 10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine subangular blocky structure; very friable; many fine roots throughout and few medium and coarse roots throughout; common very fine and fine moderate-continuity tubular pores; slightly effervescent throughout; slightly alkaline; abrupt smooth boundary.

Cg1—13 to 22 inches; 50 percent very dark gray (10YR 3/1) and 50 percent dark gray (10YR 4/1) silt loam; massive but parts along planes of horizontal weakness; very friable; few fine roots throughout; common very fine moderate-continuity tubular pores; common fine rounded grayish brown (10YR 5/2) masses of carbonate throughout and few fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; strongly effervescent throughout; slightly alkaline; abrupt smooth boundary.

2Cg2—22 to 29 inches; 50 percent very dark gray (2.5Y 3/1) and 50 percent dark gray (2.5Y 4/1), stratified silt loam and fine sandy loam, grayish brown (2.5Y 5/2) dry; massive but parts along planes of horizontal weakness; very friable; few fine roots throughout; common very fine moderate-continuity tubular pores; few fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; strongly effervescent throughout; slightly alkaline; clear smooth boundary.

2Cg3—29 to 41 inches; 35 percent very dark gray (2.5Y 3/1), 34 percent dark gray (2.5Y 4/1), and 31 percent light brownish gray (2.5Y 6/2), stratified silty clay loam and fine sand; massive but parts along planes of horizontal weakness; very friable; few fine roots throughout; common very fine moderate-continuity tubular pores; common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; slightly alkaline; clear smooth boundary.

2Cg4—41 to 48 inches; dark gray (2.5Y 4/1), stratified loam; massive but parts along planes of horizontal weakness; very friable; common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; slightly effervescent; slightly alkaline; abrupt smooth boundary.

3Ab—48 to 60 inches; black (2.5Y 2/1) silty clay loam, gray (2.5Y 5/1) dry; weak fine subangular blocky structure; friable; common fine and medium irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; slightly effervescent throughout; slightly alkaline; clear smooth boundary.

3Cg—60 to 80 inches; 50 percent dark gray (2.5Y 4/1) and 50 percent gray (2.5Y 5/1) silt loam, gray (2.5Y 6/1) dry; massive; friable; common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; slightly alkaline.

Range in Characteristics

Thickness of the solum: 7 to 56 inches
Thickness of the mollic epipedon: 7 to 36 inches
Depth to buried soil: 24 to 60 inches (if it occurs); average 30 inches
Depth to sand or gravel: 24 to 60 inches (if it occurs); average 30 inches
Seasonal high water table: At the surface to 3 feet below the surface
Depth to free carbonates: 10 to more than 60 inches
Reaction: Neutral or slightly alkaline
Other features: Where the buried soil and sand occur in the same pedon, the buried soil may be below the sand or the sand may be below the buried soil.

A horizon:
Hue—10YR
Value—2 or 3

Chroma—1 or 2
Color of redoximorphic features—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—silty clay loam, silty clay, loam, sandy clay loam, or silt loam
Reaction—neutral or slightly alkaline
Thickness—6 to 20 inches (average 10 inches)

Bg horizon:
Hue—2.5Y or 10YR
Value—2 or less
Chroma—1 or 2 moist, 1 dry
Color of redoximorphic concentrations—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—silty clay loam or silty clay
Reaction—neutral to moderately alkaline
Thickness—0 to 30 inches (average 19 inches)

Cg horizon:
Hue—2.5Y or 10YR
Value—2 or less
Chroma—2
Color of redoximorphic concentrations—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—loam, fine sandy loam, silty clay loam, or silt loam
Reaction—neutral to moderately alkaline
Thickness—10 to 50 inches (average 24 inches)

2Cg horizon:
Hue—2.5Y or 10YR
Value—3 to 5
Chroma—2 or less
Color of redoximorphic concentrations—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—stratified loam, fine sand, fine sandy loam, silty clay loam, and silt loam
Reaction—neutral to moderately alkaline
Thickness—10 to 50 inches

3Ab horizon (if it occurs):
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Color of redoximorphic concentrations—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—silty clay loam, silty clay, or silt loam
Reaction—neutral or moderately alkaline
Thickness—7 to 15 inches

3Cg horizon:
Hue—2.5Y or 10YR
Value—3 to 5
Chroma—2 or less
Color of redoximorphic concentrations—hue of 7.5YR, value of 4 or 5, and chroma of 6
Texture—silt loam, silty clay loam, or loam; sand, fine sand, loamy fine sand, or coarse sand in pedons that do not have an Ab horizon
Reaction—neutral to moderately alkaline

Forney Series

The Forney series consists of very deep, poorly drained soils on flood plains. These soils formed in clayey alluvium. Slopes range from 0 to 2 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 28 inches.

Taxonomic classification: Fine, smectitic, nonacid, mesic Vertic Fluvaquents

Typical Pedon

Forney silty clay, on a slope of about 0.5 percent, in a cultivated area on a nearly level flood plain, at an elevation of 1,000 feet above mean sea level; about 1 mile south and 3 miles west of the town of Missouri Valley, in Harrison County, Iowa; 110 feet south and 2,050 feet east of the northwest corner of sec. 19, T. 78 N., R. 44 W.; USGS Missouri Valley, Iowa-Nebraska, topographic quadrangle; lat. 41 degrees 32 minutes 58 seconds N. and long. 95 degrees 56 minutes 59 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay, dark gray (5Y 4/1) dry; moderate very fine subangular blocky structure; firm; few fine faint very dark grayish brown (10YR 3/2) redoximorphic depletions; slightly acid; clear smooth boundary.
A—5 to 8 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark grayish brown (2.5Y 4/2) crushed, gray (5Y 5/1) dry; weak fine subangular blocky structure; firm; some very fine blocky peds of black (10YR 2/1) and some black (10YR 2/1) material in channels and voids; few fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral; clear smooth boundary.
Cg1—8 to 15 inches; dark grayish brown (2.5Y 4/2) silty clay; massive but parts along planes of weakness; firm; few black (10YR 2/1) channel fillings; faces of peds have high sheen; few very fine pores; few fine distinct brown (10YR 4/3) redoximorphic concentrations; neutral; gradual smooth boundary.
Cg2—15 to 19 inches; dark grayish brown (2.5Y 4/2) silty clay; massive but parts along planes of weakness; firm; some black (10YR 2/1) channel fillings; faces of peds have high sheen; no visible pores; faces of peds are dark gray (5Y 4/1) redoximorphic depletions; few fine distinct yellowish brown (10YR 5/4) and brown (7.5YR

4/4) redoximorphic concentrations; neutral; abrupt smooth boundary.

2Ab—19 to 29 inches; black (N 2/0) silty clay, dark gray (5Y 4/1) dry; moderate fine subangular blocky structure; firm; faces of peds are smooth and have high sheen; very few very fine pores; few fine distinct olive (5Y 5/3) redoximorphic concentrations; neutral; clear smooth boundary.

2Bgb—29 to 34 inches; dark gray (5Y 4/1) silty clay, olive gray (5Y 4/2) crushed; moderate fine subangular blocky structure; very firm; some black (5Y 2/1) staining on faces of peds; faces of peds are smooth and have high sheen; no visible pores; few fine dark oxides (iron and manganese oxides); few fine faint olive (5Y 5/3) and few fine distinct strong brown (7.5YR 5/6) redoximorphic concentrations; slightly alkaline; gradual smooth boundary.

2BCgb—34 to 45 inches; gray (5Y 5/1) silty clay; weak fine subangular blocky structure with some vertical cleavage; very firm; few fine dark oxides (iron and manganese oxides); common fine prominent strong brown (7.5YR 5/8) redoximorphic concentrations; slightly alkaline; gradual smooth boundary.

2Cg—45 to 60 inches; gray (5Y 5/1) silty clay; massive with some vertical cleavage; firm; few fine dark concretions (iron and manganese oxides); slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic; the soil moisture control section is moist from November to July.
Mean annual soil temperature: 49 to 58 degrees F
Depth to redoximorphic concentrations: 4 to 10 inches
Depth to lithologic discontinuity: 10 to 26 inches
Thickness of the ochric epipedon: Less than 10 inches
Thickness of the solum: Less than 10 inches
Texture of the particle-size control section (weighted average): Silty clay or clay
Content of clay: 50 to 60 percent
Content of sand: Less than 15 percent
Other features: The 2Bgb and 2Cg horizons are separated by a 2Ab horizon in some pedons.

Ap or A horizon:
Hue—10YR, 2.5Y, or N
Value—3
Chroma—0 to 2
Texture—clay, silty clay, or silty clay loam; silt loam with 20 to 27 percent clay in some pedons
Content of clay—27 to 60 percent
Calcium carbonate equivalent—0 to 15 percent; 0 to 25 percent in pedons that are silt loam or silty clay loam
Reaction—slightly acid to slightly alkaline; slightly acid to moderately alkaline in pedons that are silt loam or silty clay loam
Thickness—4 to 10 inches

Cg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—clay or silty clay
Content of clay—40 to 60 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline
Thickness—6 to 16 inches
Other features—few or common redoximorphic features in most pedons; stratification in some pedons

2Ab horizon:
Hue—2.5Y, 5Y, or N
Value—3 or less
Chroma—1 or less
Texture—silty clay or clay
Content of clay—50 to 60 percent; in some pedons this horizon is less than 6 inches thick and has a lower content of clay
Calcium carbonate equivalent—0 to 15 percent
Content of organic matter—3 percent
Reaction—slightly acid to slightly alkaline
Thickness—10 to 20 inches

2Bg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—50 to 60 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline
Thickness—0 to 14 inches

2Cg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—50 to 60 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline

Grable Series

The Grable series consists of very deep, well drained soils on flood plains. These soils formed in 18 to 30 inches of calcareous silty alluvium and in the underlying sandy alluvium. Slopes range from 0 to 5 percent. Mean annual air temperature is about 53 degrees F, and mean annual precipitation is about 28 inches.

Taxonomic classification: Coarse-silty over sandy or sandy-skeletal, mixed, superactive, calcareous, mesic Mollic Udifluvents

Typical Pedon

Grable silt loam, in a cultivated field in a nearly level area, at an elevation of 1,005 feet above mean sea level; about 1 1/2 miles east of the Missouri River in Harrison County, Iowa; about 350 feet west and 1,100 feet south of the center of sec. 33, T. 79 N., R. 45 W.; USGS Missouri Valley topographic quadrangle; lat. 41 degrees 36 minutes 27 seconds N. and long. 95 degrees 58 minutes 18 seconds W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (2.5Y 3/2) silt loam, grayish brown (2.5Y 5/2) dry; weak fine subangular blocky structure parting to weak fine granular; very friable; few very fine pores; some very fine sand grains; few fine faint grayish brown (2.5Y 5/2) redoximorphic depletions; strongly effervescent; slightly alkaline; clear smooth boundary.

C1—6 to 23 inches; alternating layers of grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) silt loam; weak thin platy structure resulting from deposition; very friable; few fine pores; 1-inch strata of dark grayish brown silty clay loam at a depth of about 15 inches; few dark oxide stains; some organic coats around root channels; some very fine sand on horizontal faces; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations between depths of 10 and 17 inches; strongly effervescent; slightly alkaline; abrupt smooth boundary.

2C2—23 to 60 inches; stratified, grayish brown (2.5Y 5/2) fine sand; single grain; loose; a lens of silt loam between depths of 49 and 52 inches; some dark oxide stains; common fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; few fine faint gray (5Y 6/1) redoximorphic depletions between depths of 49 and 52 inches; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: Less than 10 inches
Depth to sandy alluvium: 18 to 30 inches
Thickness of the ochric epipedon: Less than 10 inches
Content of clay in the upper part of the particle-size control section (weighted average): 12 to 16 percent
Content of clay in the lower part of the particle-size control section (weighted average): 2 to 10 percent
Content of sand in the upper part of the particle-size control section (weighted average): 5 to 20 percent
Content of sand in the lower part of the particle-size control section (weighted average): 65 to 95 percent

Ap or A horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—1 to 3
Texture—silt loam, loam, very fine sandy loam, or silty clay loam
Content of clay—18 to 30 percent
Content of sand—10 to 75 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—moderately alkaline or slightly alkaline

C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silt loam or very fine sandy loam; strata up to 2 inches thick of finer or coarser material in some pedons
Content of clay—12 to 16 percent
Content of sand—30 to 75 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline to strongly alkaline

2C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—fine sand, sand, or loamy sand or stratified with these textures; strata of finer material 1 to 2 inches thick in some pedons
Content of clay—2 to 10 percent
Content of sand—70 to 95 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline to strongly alkaline
Other features—redoximorphic features typically are on the surface of the strata and are considered to be relict

Haynie Series

The Haynie series consists of very deep, well drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 5 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 28 inches.

Taxonomic classification: Coarse-silty, mixed, superactive, calcareous, mesic Mollic Udifluvents

Typical Pedon

Haynie silt loam, in a nearly level cultivated field, at an elevation of 1,065 feet above mean sea level; about 1 1/2 miles west and 1 mile north of Whiting, in Monona County, Iowa; 790 feet west and 1,420 feet north of the center of sec. 34, T. 85 N., R. 46 W.; USGS Sloan, Iowa, topographic quadrangle; lat. 42 degrees 08 minutes 20 seconds N. and long. 96 degrees 11 minutes 15 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (2.5Y 5/2) dry; small clods parting to weak fine subangular blocky structure and weak fine granular structure; some evidence of horizontal cleavage and stratification of lighter colors in the lower part; very friable; few very dark brown (10YR 3/3) spots of organic coating; slightly effervescent; slightly alkaline; clear smooth boundary.

C—7 to 60 inches; alternating layers of dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam, light brownish gray (2.5Y 6/2) dry; common fine faint gray (5Y 5/1) and few fine distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; some strata do not have mottles; massive but parts along some horizontal planes; common lenses of very fine sandy loam 1/4 to 1/8 inch thick; a lens of very fine sandy loam at a depth of 10 to 13 inches; very friable; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 58 degrees F
Depth to secondary calcium carbonate: 0 to 10 inches
Depth to redoximorphic concentrations: 6 to 10 inches; typically more than 24 inches
Thickness of the solum: Less than 10 inches
Thickness of the ochric epipedon: Less than 10 inches
Texture of the particle-size control section (weighted average): Silt loam or very fine sandy loam
Content of clay: 15 to 18 percent
Content of sand: 0 to 15 percent
Other features: A clay substratum phase is recognized; this phase typically has strata of silty clay loam and silty clay below a depth of 50 inches. A sandy substratum phase also is recognized. Some pedons have sandy materials below a depth of 60 inches.

Ap horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—2
Texture—silt loam, very fine sandy loam, or silty clay loam
Content of clay—15 to 30 percent
Content of sand—18 to 55 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—neutral or slightly alkaline
Thickness—6 to 10 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Color of redoximorphic concentrations—hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 1 to 8
Texture—silt loam or very fine sandy loam; strata of fine sandy loam and loamy fine sand in some pedons
Content of clay—15 to 18 percent
Content of sand—18 to 80 percent
Calcium carbonate equivalent—3 to 30 percent
Reaction—slightly alkaline or moderately alkaline

Hobbs Series

The Hobbs series consists of very deep, well drained soils on flood plains, footslopes, and alluvial fans. These soils formed in stratified silty alluvium. Slopes range from 0 to 6 percent. Mean annual temperature is 52 degrees F, and mean annual precipitation is 25 inches at the type location.

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

Typical Pedon

Hobbs silt loam, in a bluegrass pasture, on a slope of less than 1 percent, about 5 miles north and 4 miles west of Superior, in Nuckolls County, Nebraska; 400 feet south and 100 feet east of the northwest corner of sec. 32, T. 2 N., R. 7 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; hard, friable; neutral; abrupt smooth boundary.

C1—7 to 34 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; moderate fine and medium granular structure; slightly hard, very friable; neutral; clear smooth boundary.

C2—34 to 44 inches; gray (10YR 5/1) silt loam, dark gray (10YR 4/1) moist; moderate fine and medium granular structure; slightly hard, very friable; neutral; clear smooth boundary.

C3—44 to 60 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable; neutral.

Range in Characteristics

Soil moisture regime: Ustic
Depth to free calcium carbonate: Typically more than 40 inches; some pedons have a thin surface layer of recent deposition that contains small amounts of free carbonates
Thickness of the mollic epipedon: 6 to 20 inches
Texture of the particle-size control section (weighted average): Silt loam
Content of clay: 15 to 27 percent
Content of sand content: 0 to 15 percent
Other features: Some pedons have thin strata with colors that are within the range or that have slightly higher or lower value. Buried soils are common.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist; pedons in undisturbed areas have thin strata with higher value
Chroma—1 or 2 dry or moist
Texture—silt loam, silty clay loam, very fine sandy loam, or fine sandy loam
Content of clay—10 to 35 percent
Reaction—slightly acid to slightly alkaline
Thickness—6 to 20 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 to 7 dry, 3 to 6 moist
Chroma—1 to 3 dry or moist
Texture—silt loam or layers of silty clay loam and thin strata of slightly coarser or finer textured material
Content of clay—15 to 30 percent
Reaction—slightly acid to moderately alkaline

Ida Series

The Ida series consists of very deep, well drained, calcareous soils on uplands and high stream benches. These soils formed in loess. Slopes range from 2 to 60 percent. Mean annual air temperature is about 49 degrees F, and mean annual precipitation is about 28 inches.

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

Typical Pedon

Ida silt loam (fig. 7), on a slope of 5 percent, in a cultivated field, at an elevation of 1,395 feet above mean sea level, in Crawford County, Iowa; 150 feet north and 2,400 feet west of the southeast corner of sec. 7, T. 85 N., R. 41 W.; USGS Danbury, Iowa, topographic quadrangle; lat. 42 degrees 10 minutes 57.5 seconds N. and long. 95 degrees 39 minutes 40.6 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; 90 percent brown (10YR 4/3) and 10 percent brown (10YR 5/3) silt loam, brown (10YR 5/3) dry; few fine faint brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; common very fine and fine roots; few tubular pores; 22 percent clay; dark brown (10YR 3/3) organic coats; few fine and medium irregular carbonate concretions; strongly effervescent; slightly alkaline; clear smooth boundary.

AC—6 to 12 inches; brown (10YR 5/3) silt loam; few fine faint brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; few fine roots; common fine tubular pores; 22 percent clay; dark brown (10YR 3/3) organic coats; common fine and medium irregular carbonate concretions; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—12 to 18 inches; yellowish brown (10YR 5/4) silt loam; few fine faint grayish brown (10YR 5/2) and few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; few fine roots; common fine tubular pores; 22 percent clay; common fine and medium irregular carbonate concretions and few fine irregular very dark brown (7.5YR 2/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—18 to 25 inches; yellowish brown (10YR 5/4) silt loam; few fine faint grayish brown (10YR 5/2) and few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; few fine roots; common fine tubular pores; 23 percent clay; few fine irregular carbonate concretions and few fine irregular very dark brown (7.5YR 2/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; clear smooth boundary.

C3—25 to 31 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (10YR 6/2), common coarse faint yellowish brown (10YR 5/6), and few fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; common fine tubular pores; 23 percent clay; few fine irregular carbonate concretions and few fine irregular very dark brown (7.5YR 2/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; gradual smooth boundary.

C4—31 to 46 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (2.5Y 6/2) and common coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; common fine tubular pores; 24 percent clay; few fine irregular carbonate concretions and few fine irregular very dark brown (7.5YR 2/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; gradual smooth boundary.

C5—46 to 59 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (2.5Y 6/2) and common coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; common fine tubular pores; 21 percent clay; few fine irregular dark brown (7.5YR 3/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; gradual smooth boundary.

C6—59 to 71 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (2.5Y 6/2) and common coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; common fine tubular pores; 21 percent clay; few fine irregular dark brown (7.5YR 3/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline; gradual smooth boundary.

C7—71 to 80 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct light brownish gray (2.5Y 6/2) and common coarse distinct strong brown (7.5YR 5/6) mottles; massive; friable; 20 percent clay; few fine irregular dark brown (7.5YR 3/2) soft masses of manganese accumulation; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 56 degrees F
Depth to secondary calcium carbonate: 6 to 10 inches
Thickness of the solum: Less than 10 inches
Texture of the particle-size control section (weighted average): Silt loam
Content of clay: 18 to 25 percent
Content of sand: Less than 10 percent

A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture—silt loam or silty clay loam
Content of clay—18 to 25 percent
Calcium carbonate equivalent—8 to 12 percent
Reaction—neutral to moderately alkaline
Thickness—6 to 10 inches

AC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silt loam
Content of clay—18 to 25 percent
Calcium carbonate equivalent—8 to 12 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—6 to 12 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 to 6
Texture—silt loam
Content of clay—18 to 25 percent
Calcium carbonate equivalent—8 to 12 percent
Reaction—slightly alkaline or moderately alkaline

Inglewood Series

The Inglewood series consists of very deep, moderately well drained soils on flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 3 percent. Mean annual precipitation is about 29 inches, and mean annual air temperature is about 52 degrees F at the type location.

Taxonomic classification: Sandy, mixed, mesic Oxyaquic Udifluvents

Typical Pedon

Inglewood loamy fine sand, on a slope of 2 percent, in an area of cropland, about 3 miles west and 1 mile north of Morse Bluff, in Saunders County, Nebraska; about 2,350 feet north and 1,300 feet west of the southeast corner of sec. 15, T. 17 N., R. 5 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 5 inches; dark brown (10YR 3/3) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; soft, very friable; few fine roots throughout; few fine tubular pores; neutral; abrupt wavy boundary.

C1—5 to 22 inches; stratified brown (10YR 5/3) sand

and dark grayish brown (10YR 4/2) sandy loam, very pale brown (10YR 7/3) and light brownish gray (10YR 6/2) dry; single grain; loose; few fine roots throughout; few fine tubular pores; neutral; gradual smooth boundary.

C2—22 to 30 inches; stratified brown (10YR 5/3) fine sand and very dark grayish brown (10YR 3/2) sand, light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) dry; single grain; loose; few fine roots throughout; few fine tubular pores; neutral; gradual smooth boundary.

C3—30 to 40 inches; pale brown (10YR 6/3) fine sand stratified with dark grayish brown (10YR 4/2) fine sandy loam, very pale brown (10YR 7/3) dry; few fine distinct dark yellowish brown (10YR 4/6 and 4/4) mottles; single grain; loose; neutral; gradual smooth boundary.

C4—40 to 50 inches; very pale brown (10YR 7/3) fine sand, very pale brown (10YR 8/3) dry; common medium prominent strong brown (7.5YR 5/8) mottles; single grain; loose; neutral; gradual smooth boundary.

C5—50 to 60 inches; very pale brown (10YR 7/3) sand, very pale brown (10YR 8/3) dry; single grain; loose; neutral.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is moist in some part from a depth of 3 to 5 feet from November to July

Mean annual soil temperature: 52 to 54 degrees F

Depth to secondary calcium carbonate: More than 60 inches; pedons having horizons that effervesce slightly are included in the range

Depth to redoximorphic concentrations: More than 30 inches

Depth to redoximorphic depletions: More than 30 inches

Other features: Mottles with hue of 7.5YR to 2.5Y are below a depth of 30 inches.

Texture of the particle-size control section (weighted average): Sand, fine sand, loamy sand, or loamy fine sand

Content of clay: 1 to 10 percent

Ap or A horizon:
Hue—10YR
Value—3 to 6 moist, 4 to 7 dry
Chroma—2 or 3 moist or dry
Texture—loamy fine sand or fine sand
Content of clay—3 to 10 percent
Reaction—slightly acid to slightly alkaline
Thickness—3 to 10 inches

AC horizon (if it occurs):
Hue—10YR or 2.5Y
Value—3 to 7 moist, 4 to 8 dry
Chroma—2 or 3 moist or dry
Texture—loamy fine sand, loamy sand, fine sand, or sand
Content of clay—1 to 10 percent
Reaction—slightly acid to slightly alkaline
Thickness—0 to 4 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 to 7 moist, 5 to 8 dry
Chroma—2 or 3 moist or dry
Texture—sand, fine sand, loamy sand, or loamy fine sand; strata with darker colors and finer textures in the upper part
Content of clay—1 to 10 percent
Reaction—slightly acid to slightly alkaline

Judson Series

The Judson series consists of very deep, well drained soils on footslopes and alluvial fans. These soils formed in silty colluvium. Slopes range from 0 to 12 percent. Mean annual temperature is about 50 degrees F, and mean annual precipitation is about 32 inches.

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

Typical Pedon

Judson silty clay loam (fig. 8), on a west-facing slope of 3 percent, in a cultivated area at an elevation of 1,240 feet; about 3 miles south and 3.5 miles east of Kennard, in Washington County, Nebraska; about 1,050 feet south and 100 feet west of the northeast corner of sec. 26, T. 17 N., R. 11 E.; USGS Kennard, Nebraska, topographic quadrangle; lat. 41 degrees 25 minutes 22 seconds N. and long. 96 degrees 07 minutes 53 seconds W.; NAD 27. (Colors are for moist soil unless otherwise indicated.)

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

A1—6 to 11 inches; very dark grayish brown (10YR 3/2) (crushed) silty clay loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; many very fine and fine roots; very fine and fine tubular pores; slightly acid; clear smooth boundary.

A2—11 to 23 inches; very dark brown (10YR 2/2) (crushed) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to weak fine granular; friable; many very fine and fine roots; very fine and fine tubular pores; slightly acid; clear smooth boundary.

A3—23 to 30 inches; very dark brown (10YR 2/2) (crushed) silty clay loam, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure; friable; few very fine and fine roots; very fine and fine tubular pores; moderately acid; clear smooth boundary.

AB—30 to 38 inches; very dark grayish brown (10YR 3/2) (crushed) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; very fine and fine tubular pores; slightly acid; gradual smooth boundary.

Bw—38 to 50 inches; brown (10YR 4/3) (crushed) silty clay loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; friable; fine tubular pores; slightly acid; gradual smooth boundary.

BC—50 to 60 inches; brown (10YR 4/3) (crushed) silty clay loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure; friable; fine tubular pores; slightly acid; gradual smooth boundary.

C—60 to 75 inches; brown (10YR 4/3) (crushed) silty clay loam, brown (10YR 5/3) dry; common fine faint yellowish brown (10YR 5/6) mottles; massive; friable; slightly acid; very fine and fine tubular pores.

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
Texture of the particle-size control section (weighted average): Silty clay loam
Content of clay: 30 to 35 percent
Content of sand: Less than 10 percent
Other features: Some pedons have as much as about 12 inches of overwash; the overwash has value of 3.

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam or silt loam
Content of clay—24 to 32 percent
Reaction—moderately acid to neutral
Thickness—20 to 30 inches

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
Thickness—4 to 8 inches

Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—3 to 5
Texture—silty clay loam
Content of clay—30 to 35 percent
Reaction—moderately acid to neutral
Thickness—6 to 14 inches
Other features—darker coatings on peds are common; some pedons have mottles of low or high chroma at a depth as shallow as 30 inches

BC horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—silty clay loam or silt loam
Content of clay—25 to 32 percent
Reaction—slightly acid to slightly alkaline
Thickness—6 to 10 inches
Other features—some pedons have few or common mottles with chroma of 1 to 6

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

Kennebec Series

The Kennebec series consists of deep, moderately well drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 5 percent. Mean annual air temperature is about 49 degrees F, and mean annual precipitation is about 28 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 7 miles southwest of Dow City, in Crawford County, Iowa; about 2,110 feet north and 62 feet east of the southwest corner of sec. 27, T. 82 N., R. 41 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; weak very fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

A1—8 to 18 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky and weak fine granular structure; friable; many fine pores; few fine roots; common wormholes; slightly acid; diffuse smooth boundary.

A2—18 to 32 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; very dark brown (10YR 2/2) crushed; weak fine subangular blocky structure; friable; many fine and medium pores; common wormholes; slightly acid; diffuse smooth boundary.

A3—32 to 41 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry, very dark brown (10YR 2/2) crushed; weak fine subangular blocky structure; friable; many fine and medium pores; many large wormholes; many very dark brown wormcasts; slightly acid; diffuse smooth boundary.

AC—41 to 54 inches; very dark gray (10YR 3/1) silt loam, very dark grayish brown (10YR 3/2) crushed; very weak fine subangular blocky structure; friable; many fine and medium pores; many large wormholes; some wormcasts; many fine distinct dark brown concretions visible when soil is rubbed; slightly acid; diffuse smooth boundary.

C—54 to 60 inches; very dark grayish brown (10YR 3/2) silt loam; common medium distinct dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) and few fine faint grayish brown (10YR 5/2) mottles; massive; friable; few fine dark soft bodies; slightly acid.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is 3 to 5 feet

Depth to secondary calcium carbonate: More than 60 inches

Thickness of the solum: More than 36 inches

Thickness of the mollic epipedon: More than 36 inches

Reaction in the solum: Slightly acid or neutral; ranges to moderately acid in the upper part of the A horizon

Texture of the particle-size control section (weighted average): Silt loam or silty clay loam

Content of clay: 24 to 30 percent; variable below a depth of 40 inches

Content of sand: Less than 10 percent; variable below a depth of 40 inches

A horizon:

Hue—10YR

Value—2 or 3 (3 or 4 in overwash phase); value increases gradually 1 or 2 units with increasing depth below the A2 horizon

Chroma—1 (2 in pedons that have value of 2 or in overwash phase)

Texture—silt loam or silty clay loam

Content of clay—22 to 30 percent

Reaction—moderately acid to neutral

Thickness—30 to 50 inches

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—silt loam

Content of clay—24 to 28 percent

Reaction—slightly acid or neutral

Other features—some pedons have few fine concretions or fine faint to distinct dark yellowish brown, dark brown, strong brown, and grayish brown mottles

Kezan Series

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

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

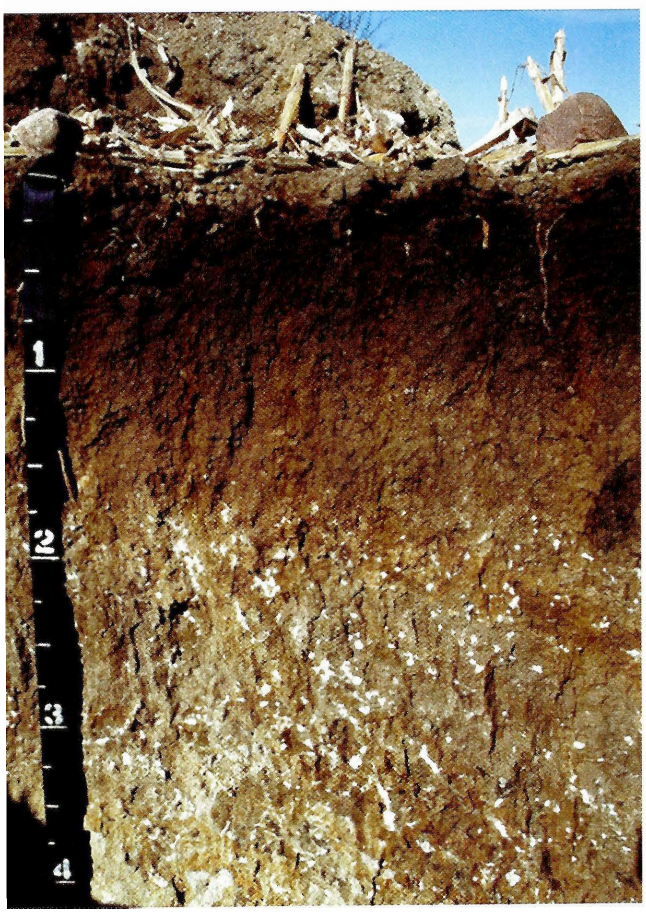

Figure 6.—Profile of Burchard clay loam. This well drained soil formed in glacial till. It is on backslopes in the uplands. Concretions of calcium carbonate are visible below a depth of 2 feet. Depth is marked in feet.

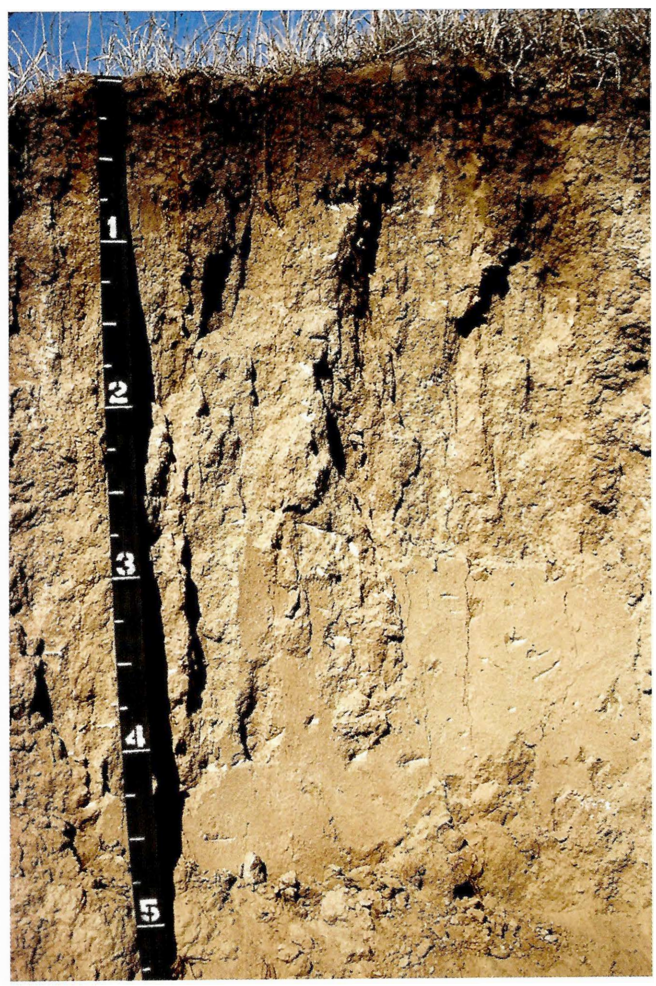

Figure 7.—Profile of Ida silt loam. This well drained soil formed in loess. It is on backslopes in the uplands and on some narrow ridgetops. It is calcareous at or near the surface, and secondary calcium carbonate is common throughout. Depth is marked in feet.

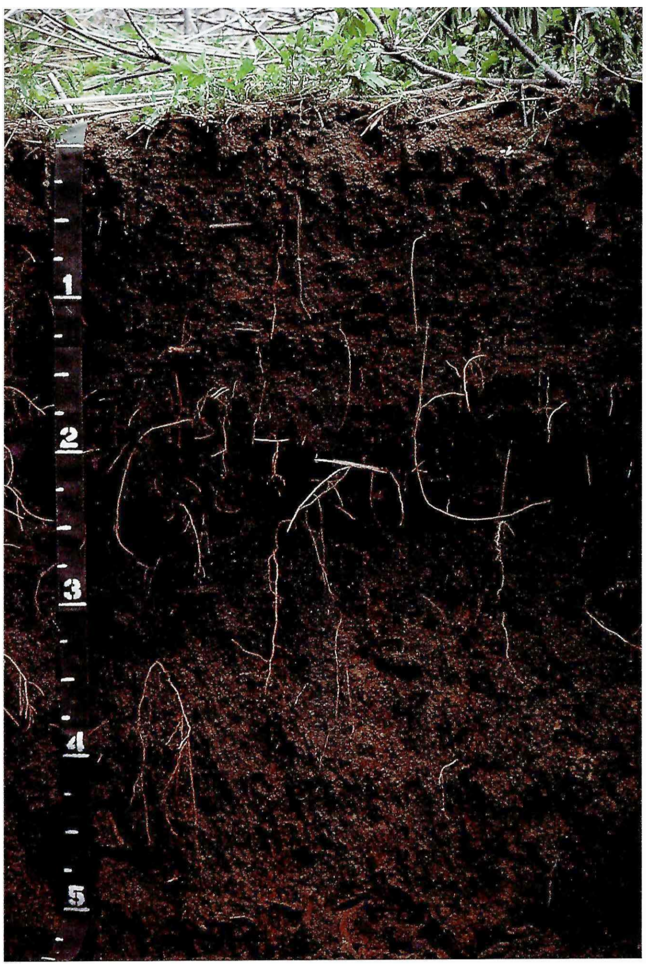

Figure 8.—Profile of Judson silty clay loam. This well drained soil formed in colluvium derived from loess. It has a thick mollic epipedon and well developed structure. Depth is marked in feet.

Figure 9.—Profile of Kezan silt loam. This poorly drained soil formed in stratified silty alluvium. The profile consists of light-colored silty alluvium over darker clayey alluvium. Depth is marked in feet.

Figure 10.—Profile of Monona silt loam. This well drained soil formed in loess. It has well developed structure and is not calcareous in the upper part. Depth is marked in feet.

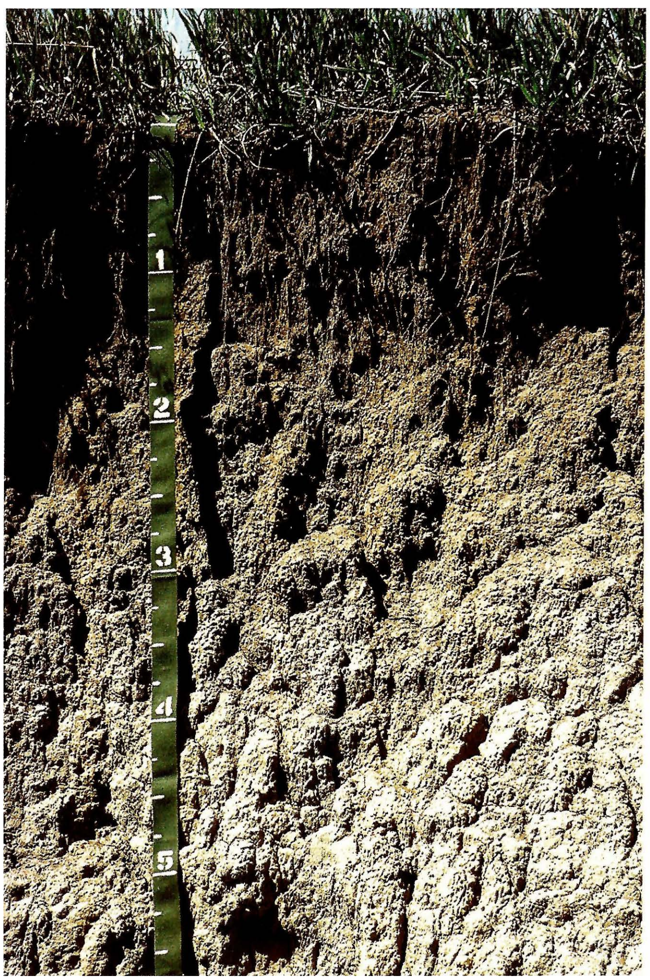

Figure 11.—Profile of Moody silty clay loam. This soil formed in loess. It is on summits and backslopes in the uplands in the western part of the county. Secondary calcium carbonate is common below a depth of 3 feet. Depth is marked in feet.

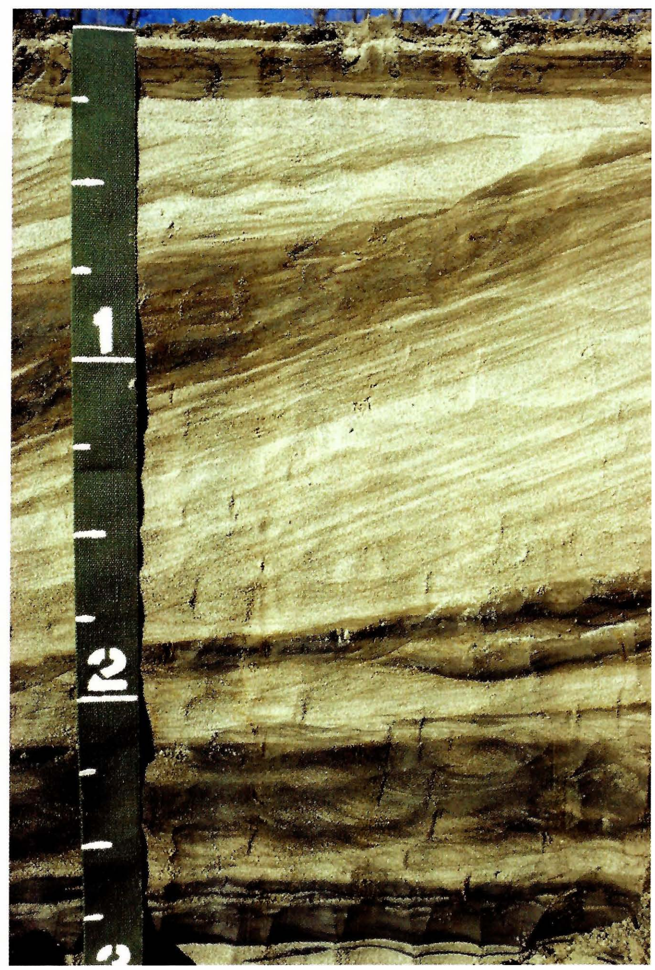

Figure 12.—Profile of Sarpy loamy fine sand. This excessively drained soil is on flood plains along the Missouri River. It formed in sandy alluvium. The strata show the changing angles of the bedding planes as the river changed course over time. Depth is marked in feet.

Typical Pedon

Kezan silt loam (fig. 9), on a north-facing slope of 1 percent, in an alfalfa field 3 miles west of Brainard, in Butler County, Nebraska; about 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 a depth of 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

Depth to secondary calcium carbonate: Typically more than 60 inches; ranges from 12 to 30 inches in some pedons

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

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; slightly alkaline or moderately alkaline in the calcareous overwash phase
Thickness—4 to 9 inches

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 features—redoximorphic concentrations with hue of 7.5YR or 5YR and value and chroma of 4
Texture—silt loam or silty clay loam
Content of clay—24 to 35 percent
Reaction—neutral to moderately alkaline
Thickness—10 to 20 inches

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 features—redoximorphic concentrations with hue of 7.5YR or 5YR and value and chroma of 4
Texture—silt loam or silty clay loam
Content of clay—24 to 35 percent
Reaction—neutral to moderately alkaline

Luton Series

The Luton series consists of very deep, poorly drained and very poorly drained soils on flood plains. These soils formed in clayey alluvial sediments. Slopes range from 0 to 2 percent. Mean annual air temperature is about 51 degrees F, and mean annual precipitation is about 30 inches.

Taxonomic classification: Very fine, smectitic, mesic Typic Endoaquerts

Taxadjunct features: The Luton soils in Washington County have secondary calcium carbonates higher in the profile than is defined as the range for the series. They also have gypsum crystals.

Typical Pedon

Luton silty clay, on a slope of less than 1 percent, in a cultivated field at an elevation of 1,015 feet, about 2 miles east of Herman, in Washington County, Nebraska; about 175 feet west and 80 feet north of the southeast corner of the northeast quarter of sec. 28, T. 20 N., R. 11 E.; USGS Herman, Nebraska, topographic quadrangle; lat. 41 degrees 40 minutes 35 seconds N. and long. 96 degrees 10 minutes 26 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark gray (2.5Y 3/1) silty clay, dark gray (2.5Y 4/) dry; very dark grayish brown (2.5Y 3/2) (moist) in the lower 2 inches; strong fine and medium granular structure; firm (moist); moderately plastic (wet); noncalcareous; slightly alkaline; abrupt smooth boundary.

A—6 to 12 inches; black (10YR 2/1) silty clay, very dark gray (N 3/0) dry; slightly lighter in color in the lower part; moderate fine angular blocky structure parting to strong fine granular; firm; hard when dry; noncalcareous; slightly alkaline; abrupt smooth boundary.

Bkg1—12 to 16 inches; very dark gray (2.5Y 3/1) clay, dark gray (2.5Y 4/1) dry; few fine faint light yellowish brown (10YR 6/4) masses of oxidized iron; moderate medium angular blocky structure parting to moderate very fine and fine angular blocky; firm; hard when dry; common fine and medium spherical carbonate concretions throughout; slight effervescence; moderately alkaline; abrupt smooth boundary.

Bkg2—16 to 24 inches; black (10YR 2/1) clay, black (N 2/0) dry; weak medium angular blocky structure parting to very fine and fine angular blocky; firm; hard when dry; few fine spherical carbonate concretions throughout; noncalcareous in the matrix; moderately alkaline; gradual smooth boundary.

Bkssyg—24 to 33 inches; black (10YR 2/1) clay, very dark gray (N 3/0) dry; moderate medium and coarse prismatic structure parting to strong fine angular blocky; very firm, very hard; many fine roots on faces of peds and few fine and medium roots throughout; continuous distinct slickensides (pedogenic); few fine and medium gypsum nests and common fine and medium spherical carbonate concretions throughout; slightly alkaline; clear smooth boundary.

Bssyg—33 to 43 inches; black (10YR 2/1) and very dark grayish brown (2.5Y 3/2) clay, very dark gray (N 3/0) dry; moderate coarse prismatic structure parting to strong medium angular blocky; very firm, very hard; continuous distinct slickensides (pedogenic); few gypsum nests; noncalcareous; slightly alkaline; clear smooth boundary.

Bkyg—43 to 50 inches; very dark grayish brown (2.5Y 3/2) silty clay, dark gray (2.5Y 4/1) dry; common medium yellowish brown (10YR 5/6) masses of oxidized iron; moderate medium prismatic structure parting to strong medium angular blocky; very firm, very hard; few gypsum nests and few fine spherical carbonate concretions throughout; slight effervescence; slightly alkaline; gradual smooth boundary.

B´kg—50 to 60 inches; very dark gray (2.5Y 3/1) clay, dark gray (2.5Y 4/1) dry; common medium yellowish brown (10YR 5/6) masses of oxidized iron; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; very firm, very hard; many medium spherical lime masses throughout; slightly alkaline.

Range in Characteristics

Depth to calcium carbonate: 15 to 36 inches
Thickness of the mollic epipedon: 15 to 37 inches
Mean annual soil temperature: 49 to 58 degrees F
Content of clay in the particle-size control section (weighted average): 40 to 75 percent
Content of sand in the particle-size control section (weighted average): 1 to 8 percent
Other features: Some pedons have a thin buried A horizon or strata of dark sediments. Some pedons have thin strata of silty clay loam in the B horizons.

A horizon:
Hue—10YR to 5Y or N
Value—2 or 3
Chroma—0 or 1
Texture—clay or silty clay; silt loam or silty clay loam in the overwash phase
Content of clay—40 to 75 percent; 20 to 40 percent in the overwash phase
Content of sand—less than 10 percent; 1 to 8 percent in the overwash phase
Calcium carbonate equivalent—0 to 15 percent
Reaction—neutral or slightly alkaline
Thickness—6 to 18 inches (overwash phase)

Bkg horizon:
Hue—10YR to 5Y or N
Value—2 to 5
Chroma—0 to 2
Texture—clay or silty clay
Content of clay—40 to 75 percent
Content of sand—1 to 8 percent
Calcium carbonate equivalent—0 to 25 percent

Content of gypsum—0 to 5 percent
Reaction—neutral to moderately alkaline
Thickness—10 to 30 inches

Bkyg, Bssyg, or Bkssyg horizon:
Hue—10YR to 5Y or N
Value—2 to 5
Chroma—0 to 2
Texture—clay or silty clay
Content of clay—40 to 75 percent
Content of sand—1 to 8 percent
Calcium carbonate equivalent—0 to 25 percent
Content of gypsum—5 to 15 percent
Reaction—neutral to moderately alkaline
Thickness—20 to 40 inches

Cg or Cssg horizon (if it occurs):
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam, clay, or silty clay
Content of clay—35 to 75 percent
Content of sand—1 to 8 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—neutral to moderately alkaline

Marshall Series

The Marshall series consists of very deep, well drained soils on uplands and high stream benches. These soils formed in loess. Slopes range from 0 to 20 percent. Mean annual temperature is about 50 degrees F, and mean annual precipitation is about 31 inches.

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

Typical Pedon

Marshall silty clay loam, on a west-facing slope of 3 percent, in a cultivated area about 3 miles northwest of Atlantic, in Cass County, Iowa; 829 feet south of the center of the road and 500 feet east of the center of sec. 34, T. 77 N., R. 37 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark brown (10YR 2/2) kneaded, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to weak fine granular; friable; common fine and medium root channels; few very dark grayish brown (10YR 3/2) wormcasts; moderately acid; clear smooth boundary.

A1—7 to 13 inches; very dark brown (10YR 2/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular and some weak fine subangular blocky structure; friable; common fine and medium root channels; few wormcasts; moderately acid; gradual smooth boundary.

A2—13 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) or pale brown (10YR 6/3) dry; weak fine subangular blocky structure; friable; common fine inped tubular pores and few medium root channels; pore fillings and wormcasts of brown (10YR 4/3); moderately acid; clear wavy boundary.

Bw1—18 to 26 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; weak and moderate fine subangular blocky structure; friable; common fine inped tubular pores; some thin oriented discontinuous very dark grayish brown (10YR 3/2) stains on a few peds; few black (10YR 2/1) fillings in fine vertical channels; very few very fine soft dark brown concretions (iron oxides); slightly acid; gradual smooth boundary.

Bw2—26 to 34 inches; brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; very few fine faint grayish brown (2.5Y 5/2) mottles in the lower part; friable; many fine inped tubular pores; thin discontinuous clay films on some peds; few fine soft dark brown and yellowish brown concretions (iron oxides); slightly acid; clear smooth boundary.

Bw3—34 to 41 inches; yellowish brown (10YR 5/4) and brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; common fine faint grayish brown (2.5Y 5/2) and common fine faint yellowish brown (10YR 5/6) mottles; few fine faint brown (7.5YR 4/4) mottles in the lower part; friable; many fine inped tubular pores; thin discontinuous clay films on vertical faces of peds; fine soft dark brown and yellowish brown concretions (iron oxides); slightly acid; gradual smooth boundary.

Bw4—41 to 47 inches; mottled yellowish brown (10YR 5/4), grayish brown (2.5Y 5/2), and brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; common fine faint yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; friable; many fine and medium inped tubular pores; few thin discontinuous films on some vertical faces; slight increase in grayish brown color in ped interiors; many fine inped tubular pores; very few very fine soft black concretions (manganese oxides); slightly acid; gradual smooth boundary.

BC—47 to 58 inches; mottled yellowish brown (10YR

5/4) and grayish brown (2.5Y 5/2) silty clay loam; weak medium and coarse prismatic structure parting to weak medium subangular blocky; common fine faint yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; friable; many fine and medium inped tubular pores; very few very fine soft black concretions (manganese oxides); very few indistinct silt coats on a few vertical faces; slightly acid or neutral; diffuse smooth boundary.

C—58 to 68 inches; mottled yellowish brown (10YR 5/4) and olive gray (5Y 5/2) silty clay loam; massive with some vertical cleavage; friable; many fine and very fine tubular pores; few indistinct silt coats on vertical faces; few fine soft dark brown or black concretions (iron and manganese oxides); mottled oxidized and leached weathering zone; neutral.

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: Typically more than 120 inches; ranges from 72 to more than 120 inches
Depth to the cambic horizon: 10 to 24 inches
Thickness of the solum: 40 to 70 inches
Thickness of the mollic epipedon: 10 to 24 inches
Texture of the particle-size control section (weighted average): Silty clay loam
Content of clay: 27 to 34 percent
Content of sand: Less than 10 percent; typically less than 5 percent (mostly very fine sand)
Other features: Depth to the horizon with maximum clay content decreases with increasing slope gradient. A zone that does not have mottles is immediately below the A horizon. This zone is at least 12 inches thick.

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2 (2 in pedons that have value of 3)
Texture—silty clay loam or silt loam
Content of clay—25 to 35 percent
Reaction—moderately acid or slightly acid; neutral in the Ap horizon in some pedons
Thickness—10 to 24 inches

BA horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Note—colors with value of 3 and chroma of 2 occur as coatings on faces of peds below the mollic epipedon in some pedons
Texture—silty clay loam
Content of clay—27 to 34 percent
Reaction—moderately acid or slightly acid
Thickness—2 to 6 inches

Bw horizon:
Hue—10YR or 2.5Y
Value—3 or 4 (upper part), 4 or 5 (lower part)
Chroma—3 (upper part), 2 to 4 (lower part)
Texture—silty clay loam
Content of clay—27 to 34 percent (mostly 30 to 34 percent); some very thin discontinuous clay films are evident on vertical faces of peds, but the B/A clay ratio is only about 1:1
Reaction—moderately acid or slightly acid
Thickness—20 to 34 inches

BC and C horizons:
Hue—10YR to 5Y
Value—4 or 5
Chroma—2 to 6
Mottles—grayish brown, yellowish brown, strong brown, and brown mottles are in the lower part of the B horizon and in the C horizon; the mottles increase in size and abundance with increasing depth; the grayish colors are considered to be relict
Texture—silt loam or silty clay loam
Reaction—slightly acid or neutral

Monona Series

The Monona series consists of very deep, well drained soils on uplands and high stream terraces. These soils formed in loess. Slopes range from 0 to 40 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 28 inches.

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

Typical Pedon

Monona silt loam (fig. 10), on a slope of 1 percent, in a cultivated area, at an elevation of 1,370 feet above mean sea level; about 7 miles east of Woodbine, in Harrison County, Iowa; 220 feet north and 1,044 feet east of the southwest corner of sec. 13, T. 80 N., R. 41 W.; USGS Portsmouth, Iowa, topographic quadrangle; lat. 41 degrees 43 minutes 59 seconds N. and long. 95 degrees 34 minutes 22 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark brown (10YR 2/2) silt loam, very dark brown (10YR 2/2) crushed, very dark grayish brown (10YR 3/2) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few very fine pores; slightly acid; clear smooth boundary.

A—7 to 15 inches; very dark brown (10YR 2/2) and dark brown (10YR 3/3) silt loam, very dark grayish brown (10YR 3/2) crushed, very dark grayish brown (10YR 3/2) and brown (10YR 5/3) dry; weak very fine subangular blocky structure parting to very fine granular; friable; few very fine pores; slightly acid; clear smooth boundary.

Bw1—15 to 21 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; common very fine pores; neutral; gradual smooth boundary.

Bw2—21 to 30 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many very fine pores; few very fine soft dark concretions (oxides); neutral; gradual smooth boundary.

C—30 to 60 inches; brown (10YR 4/3) silt loam; common very fine faint brown (7.5YR 4/4) and few fine distinct grayish brown (2.5Y 5/2) mottles; massive; very friable; few very fine pores; many very fine soft dark concretions (oxides); neutral grading with depth to slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic

Mean annual soil temperature: 50 to 56 degrees F

Depth to secondary calcium carbonate: 2 to 6 feet; dominantly 4 feet

Depth to the cambic horizon: 10 to 20 inches

Depth to relict redoximorphic concentrations: 22 to 65 inches

Thickness of the solum: 22 to 60 inches

Thickness of the mollic epipedon: 10 to 24 inches

Texture of the particle-size control section (weighted average): Silt loam

Content of clay: 24 to 28 percent; the content of clay decreases regularly from the A horizon downward to the C horizon.

Other features: The solum in pedons that are leached to a depth of 6 feet is neutral in reaction at a depth of 2 feet and below this depth. Thickness of the mollic epipedon, thickness of the cambic horizon, depth to carbonates, thickness of the solum, and depth to mottles typically decrease as the gradient increases on convex slopes. Some pedons have sand and gravel within a depth of 5 feet.

A horizon:

Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—20 to 30 percent; 20 to 35 percent in some pedons
Content of sand—less than 5 percent
Reaction—neutral to moderately acid
Thickness—10 to 20 inches

AB or BA horizon (if it occurs):

Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—silt loam or silty clay loam
Content of clay—20 to 30 percent
Content of sand—less than 5 percent
Reaction—neutral or slightly acid
Thickness—0 to 6 inches

Bw horizon:

Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam or silty clay loam in the upper part; silt loam in the lower part
Content of clay—24 to 28 percent
Content of sand—less than 5 percent
Reaction—neutral or slightly acid
Thickness—12 to 45 inches

C horizon:

Hue—10YR
Value—4 or 5
Chroma—3 to 6
Redoximorphic features—relict redoximorphic concentrations with hue of 2.5Y, 10YR, or 7.5YR, value of 4 to 6, and chroma of 2 to 8
Texture—silt loam
Content of clay—18 to 24 percent
Content of sand—less than 5 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—neutral to moderately alkaline

Moody Series

The Moody series consists of very deep, well drained soils on uplands. These soils formed in loess. Slopes range from 0 to 17 percent. Mean annual precipitation is about 24 inches, and mean annual air temperature is about 46 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Udic Haplustolls

Typical Pedon

Moody silty clay loam (fig. 11), on a convex, northwest-facing slope of 2 percent, in a cultivated field about 0.5 mile northeast of Arlington, in Washington County, Nebraska; 750 feet south and 600 feet east of the northwest corner of sec. 7, T. 17 N., R. 10 E.; USGS Arlington, Nebraska, topographic quadrangle; lat. 41 degrees 27 minutes 50 seconds N. and long. 96 degrees 20 minutes 50 seconds W. (Colors are for dry soil unless otherwise indicated.)

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

A—6 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to weak fine granular; firm; common fine roots; neutral; clear smooth boundary.

Bw1—17 to 23 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; firm; common fine roots; neutral; clear smooth boundary.

Bw2—23 to 32 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; firm; common very fine roots; neutral; clear smooth boundary.

Bw3—32 to 46 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to weak medium subangular blocky; firm; 1 percent fine faint yellowish brown (10YR 5/6) iron-manganese masses; neutral; clear smooth boundary.

Bw4—46 to 62 inches; light yellowish brown (10YR 6/4) silty clay loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; firm; 1 percent fine faint yellowish brown (10YR 5/6) iron-manganese masses; neutral; clear smooth boundary.

Bk—62 to 70 inches; light yellowish brown (10YR 6/4) silt loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; friable; 15 percent medium distinct yellowish brown (10YR 5/6) iron-manganese masses; violent effervescence; moderately alkaline; gradual smooth boundary.

C—70 to 98 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; friable; 25 percent coarse distinct yellowish brown (10YR 5/6) iron-manganese masses; moderately alkaline; strong effervescence.

Range in Characteristics

Soil moisture regime: Ustic
Mean annual soil temperature: 50 to 57 degrees F
Depth to secondary calcium carbonate: 30 inches
Thickness of the mollic epipedon: 10 to 20 inches; the mollic epipedon includes the A horizon and extends into the B horizon of most pedons
Texture of the particle-size control section (weighted average): Silty clay loam
Content of clay: 24 to 35 percent
Content of sand: Less than 3 percent fine sand or coarser sand

A horizon:
Hue—10YR
Value—3 or 4 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silty clay loam, silt loam, or loam
Reaction—moderately acid to neutral
Thickness—5 to 12 inches

Bw horizon:
Hue—10YR or 2.5Y
Value—3 to 5 dry, 2 to 4 moist; 5 or 6 dry, 3 to 5 moist in the lower part
Chroma—2 or 3; 2 to 4 in the lower part
Texture—silty clay loam in the upper part; silty clay loam or silt loam in the lower part
Content of clay—24 to 35 percent
Reaction—moderately acid to neutral
Thickness—15 to 35 inches

Bk horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4
Texture—silt loam or silty clay loam
Content of clay—24 to 35 percent
Calcium carbonate equivalent—more than 15 percent; more than 5 percent higher than in the underlying horizon
Reaction—slightly alkaline or moderately alkaline
Thickness—8 to 20 inches

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4
Mottles—few or common (relict)
Texture—silt loam or silty clay loam
Calcium carbonate equivalent—3 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Moville Series

The Moville series consists of very deep, moderately well drained soils on flood plains. These soils formed in 18 to 32 inches of silty alluvium and in the underlying silty clay or clay. Slopes range from 0 to

2 percent. Mean annual precipitation is about 29 inches, and mean annual air temperature is about 51 degrees F.

Taxonomic classification: Coarse-silty over clayey, mixed, superactive, calcareous, mesic Aquic Udifluvents

Typical Pedon

Moville silt loam, on a slope of 1 percent, in a cultivated field at an elevation of 1,007 feet above sea level; about 1 1/4 miles northwest of Missouri Valley, in Harrison County, Iowa; about 2,200 feet west and 2,400 feet north of the southeast corner of sec. 4, T. 78 N., R. 44 W.; USGS Missouri Valley quadrangle; lat. 41 degrees 35 minutes 04.7 seconds N. and long. 95 degrees 54 minutes 20.5 seconds W., NAD 83. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (2.5Y 5/2) dry; weak very fine subangular blocky structure; friable; common fine roots; many very fine tubular pores; slightly effervescent; slightly alkaline; abrupt smooth boundary.

C1—6 to 15 inches; dark grayish brown (2.5Y 4/2) silt loam; massive with weak thin alluvial stratification; very friable; many very fine tubular pores; few fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; clear smooth boundary.

C2—15 to 28 inches; about 60 percent dark grayish brown (2.5Y 4/2), 35 percent grayish brown (2.5Y 5/2), and 5 percent very dark grayish brown (2.5Y 3/2) silt loam; massive with weak thin alluvial stratification; very friable; many fine roots; many very fine tubular pores; common fine distinct light olive brown (2.5Y 5/4) redoximorphic concentrations; slightly effervescent; slightly alkaline; abrupt smooth boundary.

2Ab1—28 to 35 inches; black (N 2/0) silty clay; moderate very fine subangular blocky structure; firm; common very fine roots; many very fine tubular pores; common fine prominent dark grayish brown (2.5Y 4/2) redoximorphic concentrations; neutral; clear smooth boundary.

2Ab2—35 to 44 inches; black (N 2/0) silty clay; moderate fine subangular blocky structure; firm; many very fine tubular pores; common fine prominent dark grayish brown (2.5Y 4/2) redoximorphic concentrations; neutral; clear smooth boundary.

2Bssgb1—44 to 53 inches; very dark gray (2.5Y 3/1) clay; moderate fine and medium subangular blocky structure; very firm; many very fine tubular pores; common distinct very dark gray (5Y 3/1) slickensides; very many distinct black (10YR 2/1) organic stains; common fine distinct dark grayish brown (2.5Y 4/2) redoximorphic concentrations; neutral; gradual smooth boundary.

2Bssgb2—53 to 64 inches; very dark gray (5Y 3/1) clay; moderate medium subangular blocky structure; very firm; many very fine tubular pores; common faint very dark gray (5Y 3/1) slickensides; many distinct black (10YR 2/1) organic stains; common fine distinct dark grayish brown (2.5Y 4/2) redoximorphic concentrations; slightly effervescent; slightly alkaline; gradual smooth boundary.

2Bsskgb—64 to 80 inches; dark gray (5Y 4/1) clay; moderate medium prismatic structure; very firm; many very fine tubular pores; many faint dark gray (5Y 4/1) slickensides; many distinct very dark gray (10YR 3/1) organic stains; common fine distinct dark grayish brown (2.5Y 4/2) redoximorphic concentrations; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to buried horizons: 18 to 32 inches
Depth to carbonates: 0 to 10 inches
Content of clay in the upper one-third to upper one-half of the particle-size control section (weighted average): 10 to 18 percent
Content of clay in the lower one-half to lower two-thirds of the particle-size control section (weighted average): 40 to 65 percent
Content of sand in the particle-size control section (weighted average): Less than 15 percent fine sand and sand coarser than fine sand

Ap or A horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 or 3
Texture—silt loam
Content of clay—10 to 18 percent
Calcium carbonate equivalent—2 to 20 percent
Reaction—slightly alkaline or moderately alkaline
Moist bulk density—1.25 to 1.30 g/cc

C horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 to 3
Texture—silt loam
Content of clay—10 to 18 percent
Calcium carbonate equivalent—2 to 20 percent
Reaction—slightly alkaline or moderately alkaline
Moist bulk density—1.25 to 1.30 g/cc

2Ab horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay or clay
Content of clay—40 to 65 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—neutral or slightly alkaline
Moist bulk density—1.35 to 1.45 g/cc

2Bgb or 2Bkgb horizon (if it occurs):
Hue—2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 or 1
Texture—silty clay or clay
Content of clay—50 to 75 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—neutral or slightly alkaline
Moist bulk density—1.35 to 1.45 g/cc
Thickness—0 to 16 inches

2Bssgb or 2Bsskgb horizon:
Hue—2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 or 1
Texture—silty clay or clay
Content of clay—50 to 75 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—neutral or slightly alkaline
Moist bulk density—1.35 to 1.45 g/cc
Thickness—12 to 40 inches

2Cgb horizon (if it occurs):
Hue—2.5Y, 5Y, or N
Value—3 to 6
Chroma—0 or 1
Texture—silty clay or clay
Content of clay—50 to 75 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—neutral or slightly alkaline
Moist bulk density—1.35 to 1.45 g/cc

Napier Series

The Napier series consists of very deep, well drained soils on footslopes and alluvial fans. These soils formed in colluvium. Slopes range from 0 to 15 percent. Mean annual precipitation is about 31 inches, and mean annual temperature is about 52 degrees F.

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

Typical Pedon

Napier silt loam, on a slope of 3 percent, in a cultivated field at an elevation of 1,025 feet, about 1 mile east and 2 miles south of Thurman, in Fremont County, Iowa; about 1,960 feet south and 1,120 feet east of the northwest corner of sec. 18, T. 69 N., R. 42 W.; USGS Tabor Southwest, Iowa, topographic quadrangle; lat. 40 degrees 46 minutes 52 seconds N. and long. 95 degrees 43 minutes 25 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; friable; many roots and pores; slightly acid or neutral; gradual smooth boundary.
A—8 to 29 inches; very dark brown (10YR 2/2) silt loam, very dark grayish brown (10YR 3/2) dry; weak very fine subangular blocky and fine granular structure; friable; many roots and pores; many root channels and wormcasts; neutral; gradual smooth boundary.
BA—29 to 37 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak very fine subangular and fine granular structure; friable; few wormcasts; few root channel coatings of very dark brown (10YR 2/2); few fine roots; many pores; neutral; diffuse smooth boundary.
Bw—37 to 48 inches; brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; very friable; many pores; few roots; some dark brown (10YR 3/3) wormcasts and organic coatings; neutral; diffuse smooth boundary.
C—48 to 60 inches; brown (10YR 4/3) silt loam; massive; very friable; slightly alkaline; slightly effervescent in the lower part.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 56 degrees F
Depth to free calcium carbonate: Typically more than 60 inches; as shallow as 36 inches in some pedons
Depth to the cambic horizon: 36 to 60 inches
Thickness of the mollic epipedon: 24 to 40 inches
Texture of the particle-size control section (weighted average): Silt loam
Content of clay: 20 to 27 percent
Content of sand: Less than 10 percent
Other features: Thickness of the mollic epipedon and depth to carbonates typically decrease with increasing slope gradient.

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

Reaction—neutral or slightly acid
Thickness—18 to 34 inches

B horizon:
Hue—10YR
Value—3 in the upper part grading to 4 in the lower part
Chroma—3
Texture—silt loam
Reaction—neutral or slightly acid
Other features—dark organic coatings mask higher chroma ped interiors to a depth of more than 40 inches in most pedons

C horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam
Reaction—neutral to moderately alkaline; horizon is calcareous in some pedons

Nodaway Series

The Nodaway series consists of very deep, moderately well drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 3 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 32 inches.

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

Typical Pedon

Nodaway silt loam, in a nearly level area in a cultivated field, at an elevation of 930 feet above mean sea level; about 3 miles east of Sidney, in Fremont County, Iowa; approximately 150 feet west of the bridge, which is 1/2 mile south of the northeast corner of sec. 30, T. 69 N., R. 41 W.; USGS Randolph, Iowa, topographic quadrangle; lat. 40 degrees 45 minutes 01 second N. and long. 95 degrees 35 minutes 41 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many roots; neutral; abrupt smooth boundary.

C—7 to 60 inches; stratified dark grayish brown (10YR 4/2), grayish brown (10YR 5/2), and very dark grayish brown (10YR 3/2) silt loam; massive but tends to be platy because of stratification; friable; few fine faint brown (10YR 4/3) iron stains; few very thin strata of very dark brown (10YR 2/2) silt loam; very few very thin strata of silty clay loam; numerous wormholes and root channels; 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: More than 36 inches (if it occurs)
Texture of the particle-size control section (weighted average): Silt loam and silty clay loam
Content of clay: 18 to 28 percent
Content of sand: Less than 15 percent
Other features: A silty clay substratum phase is recognized. A dark, medium textured or moderately fine textured buried soil is below a depth of 36 inches in some pedons.

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 to 5
Chroma—1 or 2
Mottles—few or common (mottles have both high and low chroma)
Texture—silt loam or silty clay loam; only very thin lenses of material coarser than silt loam occur 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—some strata have hue of 10YR, value of 4 or 5, and chroma of 2 to 4

Nora Series

The Nora series consists of very deep, well drained soils on uplands. These soils formed in loess. Slopes range from 0 to 30 percent. Mean annual precipitation is about 24 inches, and mean annual temperature is about 46 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Udic Haplustolls

Typical Pedon

Nora silty clay loam, in a cultivated field at an elevation of 1,480 feet, about 3 miles west of Baltic, in

Minnehaha County, South Dakota; about 120 feet west and 1,890 feet south of the northeast corner of sec. 35, T. 104 N., R. 50 W.; USGS Colton Southeast, South Dakota, topographic quadrangle; lat. 43 degrees 47 minutes 06 seconds N. and long. 96 degrees 46 minutes 16 seconds W., NAD 27. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 9 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; few wormcasts; slightly acid; abrupt smooth boundary.

Bw—9 to 22 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine to medium roots; common very fine tubular pores; few wormcasts; neutral; abrupt wavy boundary.

Bk1—22 to 32 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine tubular pores; 8 percent calcium carbonate equivalent; common fine and medium rounded soft masses of calcium carbonate and few medium rounded carbonate concretions; strongly effervescent; slightly alkaline; clear wavy boundary.

Bk2—32 to 54 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; common fine and medium faint gray (10YR 5/1) (moist) redoximorphic depletions and common fine and medium prominent strong brown (7.5YR 4/6) (moist) redoximorphic concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; 7 percent calcium carbonate equivalent; common fine and medium rounded soft masses of calcium carbonate and few fine and medium rounded carbonate concretions; strongly effervescent; slightly alkaline; gradual wavy boundary.

C—54 to 80 inches; light yellowish brown (2.5Y 6/3) silt loam, light olive brown (2.5Y 5/3) moist; common fine and medium faint gray (10YR 5/1) (moist) redoximorphic depletions and common fine and medium prominent strong brown (7.5YR 5/8) (moist) redoximorphic concentrations; massive; soft, very friable, slightly sticky and slightly plastic; many very fine tubular pores; 6 percent calcium carbonate equivalent; few calcium carbonate threads; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic
Mean annual soil temperature: 47 to 54 degrees F
Depth to secondary calcium carbonate: 12 to 30 inches
Depth to the cambic horizon: 4 to 13 inches
Thickness of the mollic epipedon: 7 to 20 inches
Texture of the particle-size control section (weighted average): Silt loam or silty clay loam
Content of clay: 18 to 35 percent; the upper part of the control section typically contains 20 to 35 percent clay, and the lower part typically contains 20 to 27 percent clay; some pedons have as little as 18 percent clay
Other features: Some pedons have loamy or sandy materials below a depth of 60 inches.

A horizon:
Hue—10YR
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silty clay loam or silt loam
Reaction—slightly acid or neutral
Thickness—4 to 13 inches

Bw horizon:
Hue—10YR or 2.5Y
Value—5 or 6 dry, 3 or 4 moist
Chroma—3 or 4
Texture—silty clay loam or silt loam
Reaction—slightly acid to slightly alkaline
Thickness—6 to 20 inches

Bk horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—3 or 4
Texture—silt loam or silty clay loam
Reaction—neutral to moderately alkaline
Thickness—10 to 35 inches

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4 dry or moist
Texture—silt loam, very fine sandy loam, or silty clay loam
Reaction—slightly alkaline or moderately alkaline

Omadi Series

The Omadi series consists of very deep, moderately well drained soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 5 percent. The mean annual precipitation is about 26 inches, and the mean annual temperature is about 49 degrees F.

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

Typical Pedon

Omadi silt loam, in a cultivated area, 2 miles northeast of Hubbard, in Dakota County, Nebraska; 1,600 feet south and 50 feet west of the northeast corner of sec. 13, T. 28 N., R. 7 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak very fine granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.

A—7 to 12 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; neutral; abrupt smooth boundary.

AC—12 to 20 inches; stratified dark gray (10YR 4/1) and very dark gray (10YR 3/1) silt loam, light gray (10YR 7/1) and gray (10YR 5/1) dry; weak medium subangular blocky structure with some platy structure characteristics resulting from stratification; slightly hard, very friable; strongly effervescent; lime disseminated throughout the mass; much worm activity; few fine faint strong brown (7.5YR 5/6) iron masses in the matrix; moderately alkaline; abrupt smooth boundary.

C1—20 to 38 inches; stratified dark gray (10YR 4/1) and very dark grayish brown (10YR 3/2) silt loam, light gray (10YR 7/1) to grayish brown (10YR 5/2) dry; weak medium subangular blocky structure with some platy structure characteristics resulting from stratification; slightly hard, very friable; violently effervescent; lime disseminated throughout the mass; many medium distinct strong brown (7.5YR 5/6) iron masses in the matrix; moderately alkaline; abrupt smooth boundary.

C2—38 to 80 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; massive; slightly hard, very friable; many medium distinct strong brown (7.5YR 5/6) iron masses in the matrix; violently effervescent; lime disseminated throughout the mass and some soft lime modules; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 49 to 54 degrees F
Depth to secondary calcium carbonate: Less than 10 inches
Depth to redoximorphic concentrations: 20 to 40 inches
Thickness of the solum: Less than 20 inches
Content of clay in the particle-size control section (weighted average): 18 to 25 percent
Content of sand in the particle-size control section (weighted average): 0 to 10 percent
Other features: Some pedons have layers containing more than 35 percent clay at a depth of more than 40 inches.

Ap or A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—12 to 30 percent
Calcium carbonate equivalent—0 to 10 percent
Reaction—neutral to moderately alkaline
Thickness—9 to 15 inches

AC horizon:
Hue—10YR
Value—2 or 3 (4 or 5 in strata)
Chroma—1 or 2
Redoximorphic features—few to many faint to distinct concentrations that have hue of 7.5YR, value of 5, and chroma of 6 on faces of the stratification planes or in root channels
Texture—silt loam or silty clay loam
Content of clay—18 to 30 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—6 to 8 inches

C horizon:
Hue—10YR
Value—2 to 4 (strata of 4 or 5)
Chroma—1 or 2
Redoximorphic features—few to many faint to distinct concentrations that have hue of 7.5YR, value of 5, and chroma of 6 on faces of the stratification planes or in root channels
Texture—silt loam or silty clay loam
Content of clay—18 to 30 percent

Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline

Onawa Series

The Onawa series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 2 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 28 inches.

Taxonomic classification: Clayey over loamy, smectitic over mixed, superactive, calcareous, mesic Aquic Udifluvents

Typical Pedon

Onawa silty clay, on a slope of less than 1 percent, in a cultivated area in Monona County, Iowa; 50 feet west and 1,980 feet north of the southeast corner of sec. 1, T. 84 N., R. 47 W.; USGS Macy, Iowa, topographic quadrangle; lat. 42 degrees 07 minutes 26 seconds N. and long. 96 degrees 15 minutes 08 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark grayish brown (2.5Y 3/2) silty clay; moderate fine subangular blocky structure; firm; slightly alkaline; abrupt smooth boundary.

Cg1—7 to 22 inches; dark grayish brown (2.5Y 4/2) silty clay; massive with evidence of vertical and horizontal parting; firm; 1-inch layer of silty clay loam at a depth of 18 to 19 inches; few fine prominent red (2.5YR 5/8) and strong brown (7.5YR 5/8) redoximorphic concentrations; slightly alkaline; clear smooth boundary.

2Cg2—22 to 60 inches; dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) silt loam; massive; firm; few fine distinct strong brown (7.5YR 5/6) and reddish brown (5YR 4/3) redoximorphic concentrations; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: Less than 10 inches
Depth to lithologic discontinuity: 18 to 30 inches
Thickness of the ochric epipedon: Less than 10 inches
Thickness of the solum: Less than 10 inches
Texture of the particle-size control section (weighted average): Clay or silty clay to a depth of 18 to 30 inches; silt loam, loam, or very fine sandy loam in the lower part
Other features: Some pedons have an A horizon of fine sandy loam or loamy fine sand. This horizon contains 2 to 20 percent clay as a result of overwash. Some pedons have a transitional layer of silty clay loam between the Cg1 and 2Cg2 horizons. This layer is less than 5 inches thick.

A horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 or 2
Redoximorphic features—redoximorphic concentrations with hue of 7.5YR, 5YR, or 2.5YR and high value and chroma
Texture—silty clay, silty clay loam, loam, or silt loam
Content of clay—15 to 55 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline to moderately alkaline
Thickness—6 to 10 inches

Cg horizon:
Hue—5Y or 2.5Y; 10YR or N in strata
Value—3 to 5
Chroma—0 to 2
Redoximorphic features—redoximorphic concentrations with hue of 7.5YR, 5YR, or 2.5YR, value of 5, and chroma of 6 or 8
Texture—clay or silty clay
Content of clay—mainly 50 to 60 percent; 50 to 65 percent in some pedons
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—12 to 20 inches

2Cg horizon:
Hue—5Y or 2.5Y; 10YR or N in strata
Value—3 to 5
Chroma—0 to 2
Redoximorphic features—redoximorphic concentrations with hue of 7.5YR, 5YR, or 2.5YR, value of 5, and chroma of 6 or 8
Texture—silt loam or very fine sandy loam; the range includes loam with a high amount of very fine sand or loamy very fine sand; loamy fine sand or fine sand below a depth of 40 inches in some pedons
Content of clay—12 to 18 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline

Onawet Series

The Onawet series consists of very deep, very poorly drained soils on flood plains. These soils formed in alluvium. Slopes are 0 to 1 percent. The mean annual precipitation is about 29 inches, and the mean annual air temperature is about 51 degrees F.

Taxonomic classification: Clayey over loamy, smectitic over mixed, calcareous, mesic Aeric Fluvaquents

Typical Pedon

Onawet silty clay, in a nearly level, cultivated area about 4 1/2 miles east of Herman, in Washington County, Nebraska; 1,800 feet east and 825 feet south of the northwest corner of sec. 25, T. 20 N., R. 11 E.; USGS Herman, Nebraska, topographic quadrangle; lat. 41 degrees 40 minutes 51 seconds N. and long. 96 degrees 07 minutes 41 seconds W., NAD 27. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Cg1—7 to 16 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; moderate fine angular blocky structure; firm; common medium distinct dark reddish brown (5YR 3/3) redoximorphic concentrations; strongly effervescent; slightly alkaline; clear wavy boundary.

Cg2—16 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay, grayish brown (2.5Y 5/2) dry; massive; firm; common medium distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; strongly effervescent; slightly alkaline; abrupt wavy boundary.

2Cg3—24 to 32 inches; dark grayish brown (2.5Y 4/2) silt loam, grayish brown (2.5Y 5/2) dry; thin strata of light brownish gray (2.5Y 6/2) (dry); massive; friable; common fine distinct reddish brown (5YR 4/4) redoximorphic concentrations; strongly effervescent; slightly alkaline; clear wavy boundary.

2Cg4—32 to 39 inches; dark grayish brown (2.5Y 4/2) very fine sandy loam, grayish brown (2.5Y 5/2) dry; thin strata of light brownish gray (2.5Y 6/2) (dry); massive; very friable; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; violently effervescent; slightly alkaline; clear wavy boundary.

2Cg5—39 to 56 inches; dark grayish brown (2.5Y 4/2) silt loam, grayish brown (2.5Y 5/2) dry; massive; friable; common fine distinct yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline; clear wavy boundary.

3Cg6—56 to 80 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, grayish brown (2.5Y 5/2) dry; massive; very friable; common medium distinct yellowish brown (10YR 5/6) redoximorphic concentrations; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic
Depth to lithologic discontinuities: 18 to 35 inches
Thickness of the solum: Less than 12 inches
Texture of the particle-size control section (weighted average): Silty clay or clay to a depth of 18 to 35 inches; silt loam, loam, or very fine sandy loam in the lower part
Content of clay: 50 to 60 percent in the upper half and 12 to 18 percent in the lower half
Other features: Some pedons have an AC horizon.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 or 2
Texture—silty clay, silty clay loam, or silt loam
Content of clay—15 to 55 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—6 to 10 inches

Cg horizon:
Hue—5Y, 2.5Y, 10YR, or N
Value—3 to 5
Chroma—0 to 2
Texture—silty clay or clay
Content of clay—50 to 60 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—12 to 25 inches

2Cg horizon:
Hue—5Y, 2.5Y, 10YR, or N
Value—4 or 5
Chroma—0 to 2
Texture—silt loam, very fine sandy loam, or loam
Content of clay—12 to 18 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline

3Cg horizon:
Hue—5Y, 2.5Y, 10YR, or N
Value—4 or 5

Chroma—0 to 2
Texture—loamy fine sand, loamy sand, or fine sand
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline

Percival Series

The Percival series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 6 percent. Mean annual air temperature is about 50 degrees F, and mean annual precipitation is about 31 inches.

Taxonomic classification: Clayey over sandy or sandy-skeletal, smectitic, calcareous, mesic Aquic Udifluvents

Typical Pedon

Percival silty clay, on a slope of about 1 percent, in a cultivated area, at an elevation of about 1,005 feet above mean sea level; about 3 miles south of Modale, in Harrison County, Iowa; 490 feet south and 2,550 feet west of the northeast corner of sec. 9, T. 78 N., R. 45 W.; USGS Modale, Iowa-Nebraska, topographic quadrangle; lat. 41 degrees 34 minutes 45 seconds N. and long. 96 degrees 01 minute 23 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; weak fine subangular blocky structure; firm; few fine pores; few strong brown (7.5YR 5/6) root stains; slightly effervescent; slightly alkaline; clear smooth boundary.

Cg1—8 to 24 inches; grayish brown (2.5Y 5/2) and dark gray (5Y 4/1) silty clay, dark grayish brown (2.5Y 4/2) crushed; firm; few very fine pores; few fine distinct dark reddish brown (5YR 3/4) and strong brown (7.5YR 5/6) redoximorphic concentrations; massive but parts along planes of weakness; strongly effervescent; slightly alkaline; abrupt smooth boundary.

2Cg2—24 to 60 inches; stratified grayish brown (2.5Y 5/2) loamy fine sand and fine sand; single grain; loose; common fine dark accumulations (Fe-Mn oxides); few fine distinct strong brown (7.5YR 5/6) and brown (7.5YR 4/4) redoximorphic concentrations and few fine faint gray (10YR 5/1) redoximorphic depletions; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic
Mean annual soil temperature: 49 to 58 degrees F
Depth to secondary calcium carbonate: Less than 10 inches
Depth to lithologic discontinuity: 15 to 30 inches
Thickness of the solum: Less than 10 inches
Thickness of the ochric epipedon: Less than 10 inches
Texture of the particle-size control section (weighted average): Clay or silty clay in the upper part; stratified loamy fine sand or fine sand below a depth of 15 to 30 inches (typically about 24 inches)
Content of clay: 40 to 60 percent in the upper part and 2 to 12 percent in the lower part
Content of sand: 0 to 5 percent in the upper part and 70 to 80 percent in the lower part

Ap horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—1 or 2
Texture—silty clay, clay, or silty clay loam
Content of clay—35 to 60 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—6 to 9 inches

Cg horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1 or 2
Color of redoximorphic features—hue of 5YR, 7.5YR, or 10YR, value of 3 to 6, and chroma of 4 to 6
Texture—clay or silty clay
Content of clay—50 to 60 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—9 to 21 inches

2Cg horizon:
Hue—2.5Y
Value—4 to 6
Chroma—2
Texture—fine sand or loamy fine sand; dominantly fine sand and medium sand; lenses (less than 6 inches thick) of silt loam, loam, silty clay loam, and silty clay are in the middle or lower part of the horizon in some pedons.
Content of clay—less than 10 percent
Calcium carbonate equivalent—0 to 25 percent
Reaction—slightly alkaline or moderately alkaline

Platte Series

The Platte series consists of somewhat poorly drained soils on flood plains in river valleys. These soils are shallow over coarse sand to gravelly coarse sand. They formed in sandy and loamy alluvium deposited over coarse sand or gravelly sand. Permeability is very rapid in the lower part. Slopes range from 0 to 3 percent but are typically less than 1 percent. Mean annual temperature is about 51 degrees F, and mean annual precipitation is about 25 inches at the type location.

Taxonomic classification: Sandy, mixed, mesic Aeric Fluvaquents

Typical Pedon

Platte loam, on a slope of less than 1 percent, in an area of irrigated cropland about 4 miles north and $2^1/_2$ miles west of Kenesaw, in Adams County, Nebraska; about 1,300 feet west and 1,050 feet north of the southeast corner of sec. 6, T. 8 N., R. 12 W.; USGS Denman topographic quadrangle; lat. 40 degrees 41 minutes 09 seconds N. and long. 98 degrees 42 minutes 35 seconds W. When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 5 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, friable; strong effervescence; moderately alkaline; abrupt smooth boundary.

A—5 to 8 inches; dark gray (10YR 4/1) very fine sandy loam, very dark gray (10YR 3/1) moist; common medium distinct brown (7.5YR 5/4) iron masses in the soil matrix; weak medium and fine granular structure; soft, very friable; strong effervescence; moderately alkaline; clear smooth boundary.

C—8 to 16 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; common fine to coarse distinct brown (7.5YR 5/4) iron masses in the matrix; massive; soft, very friable; strata of loamy sand in the lower part; strong effervescence; moderately alkaline; gradual smooth boundary.

2Cg—16 to 80 inches; light gray (10YR 7/2) gravelly coarse sand, light brownish gray (10YR 6/2) moist; single grain; loose; slightly alkaline.

Range in Characteristics

Soil moisture: The soil is moist in the solum from December through April and intermittently moist from May through December. The driest months are July through September.

Depth to secondary carbonates: 40 to more than 80 inches

Secondary calcium carbonate: Calcium carbonate typically is disseminated throughout the A horizon but does not occur in some pedons.

Redoximorphic features: Common fine and medium yellowish brown to brown (hue of 10YR or 7.5YR, value of 4 or 5, chroma of 4 to 6) iron masses and concentrations throughout the profile

Depth to endosaturation: 1 to 3 feet

Thickness of the mollic colors: 6 to 9 inches (corresponds to the thickness of the A horizon)

Depth to rock fragments: 10 to 20 inches

Other features: Some pedons have an AC horizon.

A horizon:
Hue—10YR or 2.5Y
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—loam, fine sandy loam, silty clay loam, silt loam, very fine sandy loam, sandy loam, loamy fine sand, or loamy sand
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—6 to 8 dry, 4 to 6 moist
Chroma—1 to 3
Texture—loam, very fine sandy loam, fine sandy loam, or sandy loam; loamy fine sand, loamy sand, or sand in the lower part of some pedons
Content of gravel—0 to 5 percent by volume
Calcium carbonate equivalent—0 to 10 percent
Reaction—neutral to moderately alkaline

2Cg horizon:
Hue—10YR or 2.5Y
Value—6 to 8 dry, 4 to 6 moist
Chroma—1 to 4
Texture—coarse sand, gravelly coarse sand, or gravelly sand
Content of gravel—typically 15 to 35 percent by volume; ranges from 2 to 35 percent (the upper part commonly contains less gravel than the lower part)
Calcium carbonate equivalent—0 to 5 percent
Reaction—neutral to moderately alkaline
Other features—common stratification of the sandy and gravelly layers

Pohocco Series

The Pohocco series consists of very deep, well drained soils on uplands. These soils formed in loess. Slopes range from 2 to 30 percent. Mean annual precipitation is about 28 inches, and mean annual temperature is about 51 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Typic Eutrudepts

Typical Pedon

Pohocco silty clay loam, on a slope of 12 percent, in an area of cropland about 4 miles north and 2 miles west of Prague, in Saunders County, Nebraska; about 2,325 feet west and 300 feet south of the northeast corner of sec. 16, T. 16 N., R. 5 E.; USGS Prague topographic quadrangle; lat. 41 degrees 21 minutes 52 seconds N. and long. 96 degrees 51 minutes 33 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular structure; slightly hard, very friable; many fine roots throughout; common fine and medium tubular pores; neutral; abrupt smooth boundary.

Bw—6 to 15 inches; olive brown (2.5Y 4/4) silt loam, light olive brown (2.5Y 5/4) dry; common fine faint grayish brown (2.5Y 5/2) and few distinct yellowish brown (10YR 5/6) iron masses in the matrix; the matrix color and iron accumulations are relict redoximorphic features; weak coarse subangular blocky structure parting to moderate medium granular; slightly hard, friable; many fine roots throughout; common fine and medium tubular pores; few distinct dark grayish brown (10YR 4/2) continuous organic coats on vertical faces of peds; neutral; clear wavy boundary.

Bk1—15 to 20 inches; olive brown (2.5Y 4/4) silt loam, light yellowish brown (2.5Y 6/4) dry; common fine faint grayish brown (2.5Y 5/2) and few prominent strong brown (7.5YR 5/6) iron masses in the matrix; the matrix color and iron accumulations are relict redoximorphic features; weak coarse subangular blocky structure parting to moderate medium granular; slightly hard, friable; few fine roots throughout; common fine tubular pores; common fine and medium soft masses of carbonates; violent effervescence; slightly alkaline; gradual smooth boundary.

Bk2—20 to 28 inches; olive brown (2.5Y 4/4) (crushed) silt loam, light yellowish brown (2.5Y 6/4) (crushed) dry; common medium faint grayish brown (2.5Y 5/2) and few prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure parting to moderate medium granular; friable; few fine roots throughout; common fine tubular pores; few fine rounded soft masses of iron-manganese; fine and medium soft masses of carbonates; violent effervescence; moderately alkaline (pH 7.6); gradual smooth boundary.

C—28 to 60 inches; light olive brown (2.5Y 5/4) silt loam, pale yellow (2.5Y 7/4) dry; common coarse faint light brownish gray (2.5Y 6/2) and few prominent yellowish red (5YR 5/8) iron masses in the matrix; the matrix color and iron accumulations are relict redoximorphic features; massive; slightly hard, friable; few fine roots throughout; common fine tubular pores; common fine rounded soft masses of iron-manganese; few medium soft masses of carbonates and carbonate nodules; violent effervescence; slightly alkaline (pH 7.5).

Range in Characteristics

Soil moisture regime: Udic
Depth to secondary calcium carbonate: 12 to 40 inches
Depth to the cambic horizon: 3 to 7 inches
Thickness of the solum: 20 to 46 inches
Content of clay in the particle-size control section (weighted average): 20 to 30 percent
Special features: The matrix color and iron accumulations are relict features and are not indicative of present drainage conditions.

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 to 4
Texture—silty clay loam or silt loam
Content of clay—20 to 35 percent
Reaction—slightly acid to slightly alkaline
Thickness—3 to 7 inches; less than 4 inches in pedons that have mollic colors

Bw horizon:
Hue—10YR to 5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4
Texture—silty clay loam or silt loam
Content of clay—20 to 35 percent
Reaction—neutral or slightly alkaline
Thickness—7 to 15 inches

Bk horizon:
Hue—10YR to 5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 4
Texture—silt loam
Content of clay—20 to 27 percent
Calcium carbonate equivalent—0 to 5 percent
Reaction—neutral to moderately alkaline
Thickness—10 to 24 inches

C horizon:
Hue—7.5YR to 5Y
Value—4 to 6 moist, 5 to 7 dry
Chroma—2 to 6
Texture—silt loam
Content of clay—20 to 27 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline

Salix Series

The Salix series consists of very deep, moderately well drained soils on flood plains and stream terraces. These soils formed in alluvium. Slopes range from 0 to 2 percent. Mean annual precipitation is about 27 inches, and mean annual temperature is about 50 degrees F.

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

Typical Pedon

Salix silty clay loam, in a nearly level cultivated field, at an elevation of 1,060 feet in Monona County, Iowa; 120 feet west and 2,530 feet south of the northeast corner of sec. 36, T. 85 N., R. 46 W.; USGS Sloan, Iowa, topographic quadrangle; lat. 42 degrees 08 minutes 05 seconds N. and long. 96 degrees 08 minutes 11 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few fine and medium roots; neutral; clear smooth boundary.

A—7 to 15 inches; black (10YR 2/1) and very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine subangular blocky structure parting to weak fine granular; friable; few fine and medium roots; slightly acid; clear smooth boundary.

Bw1—15 to 20 inches; dark grayish brown (2.5Y 4/2) silty clay loam; very dark gray (10YR 3/1) on faces of peds; weak very fine subangular blocky structure; friable; few fine and medium roots; neutral; clear smooth boundary.

Bw2—20 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; very dark grayish brown (2.5Y 3/2) on faces of peds; weak fine and medium subangular blocky structure; friable; few fine and medium roots; neutral; clear smooth boundary.

Bw3—25 to 33 inches; grayish brown (2.5Y 5/2) silt loam; dark grayish brown (2.5Y 4/2) on faces of peds; weak medium subangular blocky structure; friable; few fine and medium roots; common fine distinct dark brown (7.5YR 3/2) and brown (7.5YR 4/4) redoximorphic concentrations; neutral; clear smooth boundary.

BC—33 to 40 inches; grayish brown (2.5Y 5/2) silt loam; dark grayish brown (2.5Y 4/2) on faces of peds; weak medium subangular blocky structure; friable; few fine and medium roots; few fine soft masses of lime; common fine distinct brown (7.5YR 4/2) redoximorphic depletions and brown (7.5YR 4/4) redoximorphic concentrations; strong effervescence; slightly alkaline; gradual smooth boundary.

C—40 to 60 inches; grayish brown (2.5Y 5/2) silt loam; massive; friable; few fine soft masses of lime; common fine distinct brown (7.5YR 4/2) redoximorphic depletions and brown (7.5YR 4/4) redoximorphic concentrations; strong effervescence; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is moist in some part from November to July
Mean annual soil temperature: 48 to 57 degrees F
Depth to secondary calcium carbonate: 20 to more than 36 inches
Depth to the cambic horizon: 14 to 20 inches
Thickness of the solum: 24 to 40 inches
Texture of the particle-size control section: Typically silty clay loam to a depth of 20 to 36 inches (mainly 24 inches) and silt loam below this depth
Content of clay: 16 to 38 percent
Other features: An overwash phase consisting of 6 to 15 inches of deposition is recognized.

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
Content of clay—20 to 30 percent
Content of sand—5 to 15 percent
Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline
Thickness—14 to 20 inches

Bw horizon:
Hue—2.5Y
Value—3 to 5
Chroma—2 or 3
Texture—silty clay loam in the upper part and silt loam in the lower part
Content of clay—28 to 38 percent in the upper part and 20 to 26 percent in the lower part
Content of sand—5 to 15 percent in the lower part

Calcium carbonate equivalent—0 to 15 percent
Reaction—slightly acid to slightly alkaline
Thickness—10 to 30 inches

BC and C horizons:
Hue—2.5Y
Value—3 to 5
Chroma—2 or 3
Texture—silt loam, loam, or very fine sandy loam
Content of clay—16 to 22 percent
Content of sand—15 to 50 percent
Calcium carbonate equivalent—0 to 30 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—5 to 10 inches (BC horizon)
Other features—secondary carbonates are in the upper part of the C horizon; some pedons have sandy material below the series control section

Sarpy Series

The Sarpy series consists of very deep, excessively drained soils on nearly level to rolling flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 9 percent. Mean annual precipitation is about 37 inches, and mean annual temperature is about 54 degrees F.

Taxonomic classification: Mixed, mesic Typic Udipsamments

Typical Pedon

Sarpy loamy fine sand (fig. 12), on a slope of 3 percent, in a soybean field at an elevation of 700 feet; about 4 miles southwest of Hardin, in Ray County, Missouri; about 990 feet south and 1,450 feet west of the northeast corner of sec. 19, T. 51 N., R. 26 W.; USGS Lexington East topographic quadrangle; lat. 39 degrees 12 minutes 06 seconds N. and long. 93 degrees 39 minutes 25 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; common fine roots; neutral; abrupt smooth boundary.

C—6 to 60 inches; grayish brown (10YR 5/2) fine sand; single grain; loose; few fine roots in the upper part; strongly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Mean annual soil temperature: 54 to 59 degrees F
Texture of the particle-size control section (weighted average): The 10- to 40-inch particle-size control section contains less than 10 percent silt plus clay and less than 40 percent silt plus clay plus very fine sand.
Other features: Some pedons do not have free carbonates throughout the control section. Stratification is evident throughout the C horizon.

Ap or A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—1 to 3
Texture—sand, loamy sand, loamy fine sand, fine sand, or fine sandy loam; a thin overwash of finer textured materials, such as silt loam or silty clay, is recognized
Content of clay—2 to 60 percent
Calcium carbonate equivalent—1 to 2 percent
Reaction—neutral to moderately alkaline
Thickness—4 to 9 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—loamy fine sand, loamy sand, fine sand, or sand; silt loam below a depth of 40 inches in some pedons
Content of clay—2 to 5 percent
Calcium carbonate equivalent—1 to 2 percent
Reaction—neutral to moderately alkaline

Shell Series

The Shell series consists of very deep, well drained soils on bottom land. These soils formed in stratified silty and loamy alluvium. Slopes range from 0 to 2 percent. Mean annual precipitation is about 28 inches, and mean annual temperature is about 50 degrees F.

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

Typical Pedon

Shell silt loam, on a slope of 1 percent, in a cultivated field about 1 mile east and 2 miles north of Schuyler, in Colfax County, Nebraska; about 1,320 feet east and 100 feet north of the southwest corner of sec. 36, T. 18 N., R. 3 E. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; hard, very friable; slightly acid; abrupt smooth boundary.

A—8 to 24 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; hard, very friable; slightly acid; clear wavy boundary.

C1—24 to 33 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) moist; massive; hard, very friable; weak medium and fine bedding planes; neutral; clear wavy boundary.

C2—33 to 55 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) moist; few fine faint brown (7.5YR 4/4) (moist) mottles; massive; hard, very friable; weak fine bedding planes; neutral; clear wavy boundary.

C3—55 to 60 inches; dark grayish brown (10YR 4/2) and light brownish gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) moist; few fine faint brown (7.5YR 4/4) (moist) mottles; massive; hard, very friable; weak fine bedding planes; slightly effervescent; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic
Mean annual soil temperature: 47 to 52 degrees F
Depth to secondary calcium carbonate: More than 48 inches
Thickness of the solum and thickness of the mollic epipedon: 20 to 36 inches
Texture of the particle-size control section (weighted average): Silt loam and silty clay loam
Content of clay: 20 to 30 percent
Other features: A buried soil is below a depth of 30 inches in some pedons. Stratification occurs within a depth of 30 to 40 inches. Some pedons do not have mottles in the C horizon. Clayey material is below a depth of 40 inches in some pedons.

A horizon:
Hue—10YR
Value—3 to 5 dry, 2 or 3 moist
Chroma—1 to 3 dry or moist
Texture—silt loam, loam, or silty clay loam
Content of clay—15 to 32 percent
Reaction—moderately acid to neutral
Thickness—20 to 36 inches

C horizon:
Hue—10YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 or 3 dry or moist
Texture—typically silt loam; the range includes silty clay loam and loam
Content of clay—20 to 30 percent
Calcium carbonate equivalent—0 to 5 percent
Reaction—moderately acid to slightly alkaline

Steinauer Series

The Steinauer series consists of very deep, well drained soils on uplands. These soils formed in calcareous glacial till. Slopes range from 5 to 60 percent. Mean annual temperature is about 52 degrees F, and 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.; USGS Garland 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 medium and coarse 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 (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: 0 to 10 percent mixed gravel and cobbles, by volume

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
Thickness—4 to 7 inches

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
Thickness—0 to 14 inches

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

Tieville Series

The Tieville series consists of very deep, poorly drained soils on flood plains. These soils formed in calcareous clayey alluvium. Slopes range from 0 to 2 percent. Mean annual precipitation is about 27 inches, and mean annual temperature is about 50 degrees F.

Taxonomic classification: Fine, smectitic, calcareous, mesic Vertic Endoaquolls

Typical Pedon

Tieville silty clay, in a cultivated field at an elevation of 1,055 feet above mean sea level, in Monona County, Iowa; 2,500 feet north and 300 feet west of the southeast corner of sec. 15, T. 85 N., R. 45 W.; USGS Hornick, Iowa, topographic quadrangle; lat. 42 degrees 10 minutes 38 seconds N. and long. 96 degrees 03 minutes 35 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; black (10YR 2/1) silty clay, very dark gray (10YR 4/1) dry; weak fine subangular blocky structure; firm; few fine roots throughout; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A—7 to 22 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; firm; few very fine and fine roots between peds; few fine irregular soft masses of carbonate; strongly effervescent; slightly alkaline; clear smooth boundary.

Bg1—22 to 30 inches; dark gray (10YR 4/1) and very dark gray (10YR 3/1) silty clay; moderate medium subangular blocky structure; firm; few fine irregular soft masses of carbonate; strongly effervescent; slightly alkaline; clear smooth boundary.

Bg2—30 to 38 inches; dark gray (10YR 4/1) silty clay; moderate medium subangular blocky structure; firm; common fine prominent brown (7.5YR 4/4) redoximorphic concentrations; few fine irregular soft masses of carbonate and few fine and medium rounded carbonate concretions; violently effervescent; moderately alkaline; clear smooth boundary.

BCg—38 to 43 inches; gray (10YR 5/1) silty clay; weak coarse prismatic structure; firm; common medium and coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; few fine irregular carbonate concretions; strongly effervescent; moderately alkaline; clear smooth boundary.

Cg—43 to 60 inches; gray (10YR 5/1) silty clay; common medium and coarse prominent yellowish brown (10YR 5/6) redoximorphic concentrations; massive; firm; few fine irregular carbonate concretions; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture regime: Aquic
Mean annual soil temperature: 47 to 54 degrees F
Depth to secondary calcium carbonate: 10 inches or less

Depth to the cambic horizon: 22 to 30 inches
Depth to gypsum accumulations: Some pedons have a few gypsum crystals in the lower part of the series control section.
Thickness of the solum: 32 to 60 inches
Thickness of the mollic epipedon: 18 to 24 inches
Texture of the particle-size control section (weighted average): Silty clay
Content of clay: 40 to 60 percent
Content of sand: Less than 15 percent

A horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—40 to 60 percent
Calcium carbonate equivalent—1 to 4 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—18 to 24 inches

Bg or Bkg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—2 to 4
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—40 to 70 percent
Reaction—slightly alkaline to strongly alkaline
Thickness—12 to 36 inches
Calcium carbonate—12 to 30 percent (Bkg horizon)

Cg horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—1 or 2
Texture—silty clay or clay
Content of clay—50 to 70 percent
Calcium carbonate equivalent—1 to 4 percent
Reaction—moderately alkaline or strongly alkaline

Vore Series

The Vore series consists of deep, moderately well drained soils on bottom land. These soils formed in silty clay loam over sand or loamy sand derived from alluvium. Slopes range from 0 to 2 percent. Mean annual precipitation is about 28 inches, and mean annual temperature is about 50 degrees F.

Taxonomic classification: Fine-silty over sandy or sandy-skeletal, mixed, superactive, calcareous, mesic Aquic Udifluvents

Typical Pedon

Vore silty clay loam, in a nearly level area on bottom land about 6 miles west of Missouri Valley, in Harrison County, Iowa; about 400 feet west and 300 feet south of the center of sec. 16, T. 78 N., R. 45 W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam (32 percent clay), grayish brown (10YR 5/2) dry; weak fine subangular blocky and weak fine granular structure; friable; few fine dark concretions (iron oxides); few dark grayish brown (10YR 4/2) peds mixed from the horizon below; slight effervescence; slightly alkaline; clear smooth boundary.

C1—7 to 24 inches; stratified dark grayish brown (2.5Y 4/2) silty clay loam (34.9 percent clay); common fine distinct grayish brown (2.5Y 5/2) and few fine distinct dark gray (10YR 4/1) and dark yellowish brown (10YR 4/4) mottles; very weak fine subangular blocky structure in some strata; friable; few dark concretions (iron oxides); firm; silty clay loam strata with about 38.5 percent clay at a depth of 19 to 24 inches; few fine sand grains on peds; strong effervescence; slightly alkaline; abrupt smooth boundary.

2C2—24 to 60 inches; stratified grayish brown (2.5Y 5/2) fine sand; few fine distinct dark gray (10YR 4/1) mottles; weak thick platy structure resulting from stratification; loose; very friable; fine sandy loam strata at a depth of 24 to 29 inches; few fine dark concretions (iron oxides); strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture regime: Udic; the soil moisture control section is moist in some part from November to July.
Mean annual soil temperature: 49 to 56 degrees F
Depth to lithologic discontinuity: 15 to 30 inches
Thickness of the solum: Less than 10 inches (A or Ap horizon)
Texture of the particle-size control section (weighted average): Silty clay loam
Content of clay: 28 to 35 percent
Other features: The soil is stratified loamy fine sand or fine sand below a depth of 15 to 30 inches (typically about 24 inches).

Ap or A horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—1 or 2
Texture—silty clay loam or silty clay
Content of clay—28 to 35 percent
Calcium carbonate equivalent—5 to 30 percent;

some pedons do not have carbonates in the A horizon
Reaction—slightly alkaline or moderately alkaline
Thickness—6 to 9 inches

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Redoximorphic features—redoximorphic concentrations with hue of 10YR, 2.5Y, or 7.5YR, value of 3 to 6, and chroma of 1 to 8
Texture—stratified silty clay loam
Content of clay—typically less than 35 percent; some pedons have strata (less than 6 inches thick) containing 35 to 40 percent clay
Content of sand—less than 15 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—9 to 21 inches

2C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2
Redoximorphic features—redoximorphic concentrations with hue of 10YR, 2.5Y, or 7.5YR, value of 3 to 6, and chroma of 1 to 8
Texture—stratified fine sand or loamy fine sand (dominantly fine sand and medium sand); lenses (less than 6 inches thick) of fine sandy loam, loam, or silt loam in most pedons
Content of clay—less than 10 percent
Calcium carbonate equivalent—5 to 30 percent
Reaction—slightly alkaline or moderately alkaline

Wathena Series

The Wathena series consists of very deep, moderately well drained soils that formed in sandy alluvium. These soils are on nearly level to rolling natural levees on flood plains. Slopes range from 0 to 4 percent. Mean annual precipitation is about 37 inches, and mean annual air temperature is about 54 degrees F.

Taxonomic classification: Sandy, mixed, mesic Mollic Udifluvents

Typical Pedon

Wathena fine sandy loam, on a slope of 1 percent, in a soybean field about 1 mile south and 5 miles east of Herman, in Washington County, Nebraska; 2,300 feet east and 500 feet south of the northwest corner of sec. 6, T. 19 N., R. 12 E. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) (crushed) fine sandy loam; weak fine granular structure; very friable; common fine roots throughout; common fine tubular pores; neutral; abrupt smooth boundary.

AC—6 to 14 inches; brown (10YR 4/3) (crushed) loamy fine sand; 5 percent fine distinct strong brown (7.5YR 5/6) mottles; granular; very friable; common fine roots throughout; common fine tubular pores; very dark grayish brown (10YR 3/2) masses of dark accumulation; slight effervescence; slightly alkaline; abrupt smooth boundary.

C1—14 to 21 inches; grayish brown (10YR 5/2) (crushed) fine sand; 2 percent fine distinct brown (7.5YR 5/4) mottles; single grain; loose; few fine roots throughout; few fine tubular pores; neutral; abrupt wavy boundary.

2C2—21 to 27 inches; dark grayish brown (10YR 4/2) (crushed) and very dark brown (10YR 2/2) (crushed), stratified silt loam; 1 percent coarse prominent yellowish red (5YR 4/6) and 5 percent fine prominent dark reddish brown (5YR 3/4) mottles; weak thin platy structure; friable; few fine roots throughout; few fine tubular pores; strong effervescence; neutral; abrupt wavy boundary.

2C3—27 to 36 inches; very dark grayish brown (10YR 3/2) (crushed) and dark grayish brown (10YR 4/2) (crushed), stratified very fine sandy loam; 5 percent fine prominent dark reddish brown (5YR 3/4) mottles; weak medium platy structure; friable; few fine roots throughout; few fine tubular pores; strong effervescence; slightly alkaline; gradual wavy boundary.

3C4—36 to 50 inches; grayish brown (10YR 5/2) (crushed), stratified fine sand; 4 percent fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; neutral; gradual wavy boundary.

3C5—50 to 58 inches; dark grayish brown (10YR 4/2) (crushed), stratified fine sand; 4 percent fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; neutral; gradual wavy boundary.

3C6—58 to 69 inches; dark grayish brown (10YR 4/2) (crushed), stratified very fine sandy loam; 25 percent medium prominent dark reddish brown (5YR 3/4) mottles; massive; friable; 30 percent medium irregular black (10YR 2/1) iron-manganese masses throughout; strong effervescence; slightly alkaline.

Range in Characteristics

Soil moisture regime: Udic
Depth to lithologic discontinuities: 16 to 43 inches and 28 to 75 inches
Thickness of the solum: 4 to 11 inches
Texture of the particle-size control section: Less than 10 percent silt plus clay and less than 40 percent silt plus clay plus very fine sand
Content of clay in the particle-size control section (weighted average): 2 to 5 percent
Other features: The soils are calcareous throughout.

Ap or A horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 or 3
Texture—loamy fine sand or fine sandy loam
Content of clay—2 to 5 percent
Reaction—neutral to moderately alkaline
Thickness—4 to 11 inches

AC or C horizon:
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4
Texture—stratified loamy fine sand and fine sand
Content of clay—2 to 5 percent
Reaction—neutral to moderately alkaline
Thickness—12 to 32 inches

2C horizon:
Hue—10YR or 2.5Y
Value—2 to 6
Chroma—2 or 3
Texture—stratified silt loam or stratified very fine sandy loam (strata consist of sandier or clayey materials)
Content of clay—3 to 35 percent
Reaction—slightly alkaline or moderately alkaline
Thickness—12 to 35 inches

3C horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—2 or 3
Texture—very fine sandy loam, loamy fine sand, loamy sand, fine sand, or sand
Content of clay—2 to 5 percent
Calcium carbonate equivalent—5 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Zook Series

The Zook series consists of very deep, poorly drained soils on flood plains or low stream terraces. These soils formed in alluvium. Slopes range from 0 to 5 percent. Mean annual precipitation is about 34 inches, and mean annual temperature is about 49 degrees F.

Taxonomic classification: Fine, smectitic, mesic Cumulic Vertic Endoaquolls

Typical Pedon

Zook silty clay loam, on a slope of less than 1 percent, in a cultivated field at an elevation of 1,150 feet; about 5 miles west of Atlantic, in Cass County, Iowa; about 2,040 feet east and 210 feet north of the southwest corner of sec. 5, T. 76 N., R. 37 W.; USGS Walnut, Iowa, topographic quadrangle; lat. 41 degrees 23 minutes 46 seconds N. and long. 95 degrees 07 minutes 44 seconds W. (Colors are for moist soil unless otherwise indicated.)

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) crushed, very dark gray (10YR 3/1) dry; weak fine granular structure parting to weak fine subangular blocky; friable; slightly compact at a depth of 6 inches; many fine roots; moderately acid; clear smooth boundary.
A1—6 to 14 inches; black (N 2/0) silty clay loam, black (N 2/0) crushed, very dark gray (10YR 3/1) dry; moderate very fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.
A2—14 to 20 inches; black (N 2/0) silty clay loam, black (N 2/0) crushed, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; friable; sheen on faces of peds; slightly acid; gradual smooth boundary.
A3—20 to 38 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; black (10YR 2/1) faces of peds; moderate medium subangular blocky structure; firm; sheen on faces of peds; slightly acid; gradual smooth boundary.
Bg—38 to 52 inches; dark gray (5Y 4/1) and very dark gray (10YR 3/1) silty clay; moderate medium subangular blocky structure; firm; sheen on faces of peds; few fine dark concretions; slightly acid; gradual smooth boundary.
Cg—52 to 60 inches; silty clay, dark gray (5Y 4/1) in the upper part, gray (5Y 5/1) in the lower part; massive but some vertical cleavage; firm; few dark concretions; slightly acid.

Range in Characteristics

Soil moisture regime: Aquic; the soil moisture control section is moist in some part from November through July in most years.
Mean annual soil temperature: 48 to 55 degrees F
Depth to redoximorphic concentrations: 36 to 60 inches
Thickness of the mollic epipedon: 36 to 60 inches
Content of clay in the particle-size control section (weighted average): 34 to 44 percent
Content of sand in the particle-size control section (weighted average): 0 to 15 percent

A horizon:
Hue—10YR or N
Value—2 or 3; value of 3 or lower extends to a depth of more than 36 inches
Chroma—0 or 1
Texture—silty clay loam or silty clay
Content of clay—about 32 to 44 percent in the upper 16 inches and 36 to 45 percent below that depth; about 20 to 26 percent in the silt loam overwash phase
Maximum content of sand—about 15 percent
Reaction—typically moderately acid or slightly acid; soils that are neutral or slightly alkaline but are not calcareous to a depth of 50 inches or more are included in the range
Thickness—26 to 40 inches

Bg and Cg horizons:
Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay loam, silty clay, or silt loam
Content of clay—20 to 45 percent

Formation of the Soils

This section describes the factors that affect soil formation in Washington County. It also describes the processes of soil formation.

Factors of Soil Formation

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

Climate and living organisms, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons, or definable layers that are the result of soil development. Landscape position can aid or deter the effects of climate and plant and animal life. The parent material also affects the kind of soil profile that forms and in extreme cases determines it almost entirely. Finally, time is needed for the parent material to develop into a soil with a recognizable horizonation or profile. Time is always required for the differentiation of soil horizons; generally, a long period of time is necessary 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. Some of the processes of soil development are unknown. Because of the complexity of the interaction of the soil-forming factors, soils can vary greatly in their appearance and characteristics from place to place.

Parent Material

Parent material is the unconsolidated mass from which soils form. It is the unaltered mineral component in which a soil forms, and it determines the chemical and mineralogical composition of the soil. In Washington County the soils formed in four major kinds of parent material: loess, glacial till, colluvium, and alluvium.

Peorian Loess is the most extensive of the parent materials in Washington County. It consists of material transported by wind and deposited during the last glacial period, between 25,000 and 14,000 years ago. It consists largely of silt particles and small amounts of clay and sand. This silty material is grayish, brownish, or yellowish brown and is a few feet to about 100 feet thick. Belfore, Crofton, Ida, Marshall, Monona, Moody, Nora, and Pohocco soils formed in Peorian Loess. These soils are mainly on uplands; a few of them are on some stream terraces. Depending on the degree of slope, the thickness of the topsoil and the depth to calcium carbonates can vary in these soils. Nearly level upland ridgetops and loess-covered stream terraces have thicker topsoil and have calcium carbonate at a greater depth than other areas (Lueninghoener, 1947; Ruhe, 1956; Schultz and others, 1951).

Glacial till is a minor parent material in the county. It is associated with the uplands. It is a heterogeneous mixture of silt, sand, and clay studded with pebbles and some stones that were probably deposited during the Kansan Glaciation (Condra and others, 1950). In some places, these deposits contain small pockets of sand and gravel. The till is generally grayish or brownish and is a firm, calcareous clay loam. Till occurs on uplands, mainly in the northern part of the county. Burchard and Steinauer soils formed in glacial till.

Colluvium is material that accumulates when loess or till is moved by gravity and water. It occurs on footslopes or the lower side slopes adjacent to the steeper uplands and consists of deep sediments of friable material. It is mostly silt but contains some clay and a small amount of sand. The color is mainly dark grayish brown or brown. Colluvium has a higher percentage of organic matter than soils on the adjacent uplands, in part because the soils in the uplands lose some of their organic matter to the soils on footslopes. Alcester, Judson, and Napier soils formed in colluvial material.

Alluvium is the second most extensive parent material in Washington County. It consists of material that is transported, sorted, and deposited by water, usually by flowing streams or rivers. The recent alluvium of the minor valleys consists of silty and clayey sediments washed from upland slopes and deposited on flood plains. Kennebec, Kezan, Nodaway, Shell, and Zook soils formed in recent alluvium. In some places, these soils are frequently or occasionally flooded and fresh deposits continue to accumulate. Kezan, Shell, and Zook soils formed in the meander belt along Bell Creek. They are silty to clayey.

The recent alluvium of the major valleys consists of sandy, silty, and clayey sediments carried from upstream and deposited on wide flood plains. In the lower lying areas adjacent to these rivers, these soils may be flooded several times a year. Areas farther away and in higher positions may be inundated only during major floods. Blencoe, Blyburg, Forney, Luton, Moville, Omadi, and Salix soils formed in the backswamp area of the Missouri River flood plain. They are silty to clayey. These soils are slightly higher on the landscape than the soils on the meander belt and are more well developed and less susceptible to flooding. Albaton, Grable, Haynie, Onawa, Onawet, Percival, Sarpy, and Wathena soils formed in the meander-belt area of the Missouri River flood plain. They are sandy to clayey. These soils are lower on the landscape than the soils in the backswamp and are less well developed and more susceptible to flooding. Cass, Inglewood, and Platte soils formed in the meander belt along the Elkhorn River. They are sandy to silty.

Climate

The amount, frequency, and distribution of rainfall and snow as well as the seasonal variation in temperature dictate the climate for a particular area. The climate directly affects the kind and amount of vegetation, living organisms within the soil, and the kind and rate of chemical reactions that occur. These factors in turn determine the degree of development of a soil. Increases in temperature increase the rate of chemical reactions, while increases in precipitation increase the amount of leaching that can occur in a soil. The amount of moisture available, the length of the growing season, and the prevailing temperature during the growing season affect the amount of vegetation. Vegetation is the principal source of organic matter in soils and is an indication of soil development.

Washington County has a midcontinental, subhumid climate with moderate temperatures and wide seasonal variations. Temperatures below 0 degrees F in winter and above 95 degrees in summer are common. The frost-free season averages about 165 days and thus provides an adequate growing season for many grain and forage crops. The average annual precipitation is about 30 inches. Spring is cool and has considerable precipitation. Thunderstorms are common during late spring and summer. Fall is mild and has occasional periods of rain. Winter is cold and has occasional snowstorms.

Enough precipitation enters the soil and moves through it to carry carbonates and other soluble elements to a depth of at least 2 feet in most soils. Except for some of the steeper soils and the soils on bottom land, most of the soils in Washington County are moderately acid to neutral in the surface layer. Some of the steeper soils have carbonates at or near the surface, either because the soil has been eroded to that depth or because the steepness does not allow water to soak in and leach the soluble elements.

Living Oganisms

Grass, trees, animals, micro-organisms, earthworms, humans, and other forms of life on or in the soil are active in soil formation. The kinds of plants and animals are determined by environmental factors, such as climate, parent material, age of the soil, relief, and drainage.

Before the soils were cultivated, the dominant vegetation in Washington 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 darkens the surface layer. The fibrous roots of these grasses penetrate the soil, make it porous, and encourage development of granular structure. The plant roots take up minerals in solution from the lower parts of the soil and eventually return them to the surface. Along the Missouri River bluffs, much of the area still has oak forests with a mixture of hickory and cedar. When these trees die and decay, they provide a more acid environment than is normal in the county.

Micro-organisms, insects, earthworms, and burrowing rodents are beneficial to soil structure and make the organic remains into humus from which living plants obtain nutrients. Small burrowing rodents, earthworms, and insects make openings and channels in the soil, which allow it to be aerated, loosened, and mixed. Their remains add to the organic matter. Plants also aid in minimizing the effects of erosion by protecting the surface from the impact of raindrops and by holding the soil with their root structure.

Relief or Topography

Relief, or lay of the land, influences the formation of soils by affecting runoff, erosion, deposition, and drainage. The slope gradient, the shape of the surface, and the permeability of the soil determine the rate of runoff, the internal drainage, and the moisture content of the soil. Internal drainage and the availability of moisture are important factors in the formation of soil horizons. Differences in relief are the main reason for the different properties in some of the soils in the county.

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

Soils in slight depressions on uplands, such as Filbert and Corley 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. Permeability is very slow in these claypan soils.

In the steep areas of the uplands, where runoff is rapid and little moisture penetrates the soil, erosion removes the surface soil almost as quickly as it forms. Lime and other elements are not leached to as great a depth as they are in the less sloping soils. The steep soils show little profile development other than a slightly dark, thin surface layer. Ida and Crofton soils are in these types of landscape positions.

The areas lower on the landscape that receive moisture in the form of runoff from the higher areas develop differently than the soils in the higher areas. Additional moisture allows organic matter to accumulate and carbonates to be leached from the profile. The soils in these areas are very favorable for vegetative growth. Judson and Alcester soils are examples.

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

Time

The passage of time enables relief, climate, and plants and animals to bring about the changes in parent material that result in the formation of a soil. If these factors continue to operate for a long period, similar kinds of soil form in widely different kinds of parent material. Soil formation, however, generally is interrupted by geologic events that expose new parent material. The longer the parent material is exposed to soil development, the greater the development of the soil profile. A mature or old soil will have been in place long enough for climate, animal and plant life, and relief to have altered the parent material into a developed soil profile.

Soils on older, stable surfaces generally have well defined horizons because the rate of soil formation has exceeded the rate of geologic erosion. Soil development in the stable landscape positions in the uplands began less than 14,000 years ago, after the deposition of loess ended. Beginning about 8,000 years ago, a warmer, drier climate emerged that encouraged prairie vegetation, which was an active soil-forming factor. About 3,000 years ago, the climate began to become more moist (USDA, 1989). A mature soil profile has a dark surface layer and a distinct subsoil. In Washington County, Belfore, Marshall, and Moody soils are examples of mature soils that have well expressed horizons.

The immature or young soils in Washington County are on steep or very steep slopes. In these areas, erosion has removed the developed soil material and new material is exposed to weathering. Examples of these immature or young soils in Washington County are Crofton, Ida, and Steinauer soils. In these situations, relief and climate are the dominant soil-forming factors. They have not allowed these soils to attain the same level of development that soils of the same parent material and same age have attained in a more stable landscape position.

Human Activities

Important changes take place in the soil after it is cultivated. Changes caused by water erosion generally are the most significant. In many of the cultivated soils in the county, much of the surface layer has been lost through water erosion. In places, gullies have formed. Tilling the surface layer alters the structure of the soil and thus reduces the natural permeability of the soil and increases the water runoff rate. Less obvious are the chemical changes brought about by applications of lime and fertilizer and the changes in microbial activity and organic matter content that result from removing the native vegetation and from growing crops. Human activities have strongly affected the formation of Kezan and Moville soils on bottom land. These originally dark soils have been covered by a new parent material, which is light colored and calcareous. This new material eroded from the uplands, largely as a result of farming.

Other human-influenced changes include the alteration of the natural water table in poorly drained soils on bottom land. Naturally meandering streams and rivers have been controlled and straightened, and thus the channels have been downcut. A series of drainage ditches that outlet to the channels has lowered the water table of the soils on the adjacent flood plain and allowed agricultural production in areas that formerly were limited for this use.

Processes of Soil Formation

Horizon differentiation is caused by at least four processes. These processes are additions, removals, transfers, and transformations. Each of these affects many substances in the soil. Examples are the addition, removal, transfer, or transformation of organic matter, soluble salts, carbonates, sesquioxides, or silicate clay minerals.

Generally, these processes promote horizon differentiation, but some tend to retard it. These processes and the changes they bring about proceed simultaneously in soils. The ultimate nature of the profile is governed by the balance of those changes within the profile.

Additions

In Washington County, the soils on flood plains are divided into two broad groups based mainly on the additions of organic matter. The soils that have a thick, dark surface layer are separated from those that do not. The dark color, or lack of it, is the most obvious difference between the Luton and Albaton soils, between the Salix and Haynie soils, and between the Blencoe and Onawa soils. In some soils on uplands, the dark surface layer is the only soil feature that reflects the processes of soil formation. Examples are Ida and Steinauer soils.

Removals

The removal of substances from parts of the soil profile accounts for some of the most obvious differences among soils in the county. An example is the downward movement of calcium carbonates that results from leaching. In Ida and Steinauer soils, little calcium carbonate has been removed. These soils are calcareous at or near the surface. No B horizon has formed in these soils. In contrast, leaching has removed calcium carbonates from the upper part of Marshall and Moody soils. This removal, along with other processes, has resulted in the differentiation of a B horizon.

Transfers

The transfer of substances from one horizon to another is evident in the soils of Washington County. Phosphorus is removed from the B horizon by plant roots, is transferred to the parts of the plant growing above the ground, and then is added to the surface layer in the plant residue.

The translocation of silicate clay minerals helps to differentiate horizons. Clay minerals from the A horizon are carried downward in suspension by percolating water. They accumulate in the B horizon in pores and root channels and as clay films on the faces of peds. Burchard and Belfore are examples of soils that are markedly affected by this process. In other soils, the content of clay in the A horizon is not markedly different from that in the B horizon and other evidence of clay movement is minimal.

Another kind of transfer in Luton, Albaton, and other very clayey soils is caused by the formation of cracks brought about by shrinking and swelling. Because of the cracks, some of the materials from the surface layer are incorporated into lower parts of the profile.

Transformations

Transformations are physical and chemical. The weathering of soil particles to smaller sizes is an example of a physical transformation. The reduction of iron, a process called gleying, is a chemical transformation. This process is common in poorly drained or very poorly drained soils, such as Zook and Luton soils. These soils are saturated for long periods. Their grayish colors are evidence of gleying.

Another kind of transformation is the weathering of a primary apatite mineral in the parent material to a secondary phosphorus compound. Apparently, the pH level must decline to about 7 before much of this weathering can take place. This process accounts for differences in the supply of available phosphorus among soils that formed in similar kinds of calcareous parent material. For example, Ida soils are calcareous and have a very low supply of available phosphorus. In contrast, Marshall soils, which have been leached and are approximately neutral in reaction, have a higher supply of available phosphorus (USDA, 1989).

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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.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

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

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

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.

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

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.

Backswamp. A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

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).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

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.

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

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

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

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

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.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

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.

Cement rock. Shaly limestone used in the manufacture of cement.

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.

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.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

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.

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

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.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

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.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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. An 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.

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

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.

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 period. Of or relating to the presence and activities of ice and glaciers, as in glacial erosion; pertaining to distinctive features and materials produced by or derived from glaciers and ice sheets, as in glacial lakes; pertaining to an ice age or region of glaciation.

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.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

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.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of the hill.

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.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Landform. Any physical, recognizable form or feature on the earth's surface, having a characteristic shape and range in composition, and produced by natural causes; it can span a wide range in size. Landforms provide an empirical description of similar portions of the earth's surface.

Landscape. An assemblage, group, or family of spatially related, natural landforms over a relatively large area; the land surface which the eye can comprehend in a single view.

Landscape position. An exact location on a landscape that has a unique combination of aspect, slope, slope shape, and elevation.

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

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.

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.

Meander belt. The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops. Landform components of the meander-belt surface are produced by a combination of gradual (lateral and down-valley) migration of meander loops and avulsive channel shifts causing abrupt cutoffs of loop segments. Landforms flanking the sinuous stream channel include point bars, abandoned meanders, meander scrolls, oxbow lakes, natural levees, and flood-plain splays. Meander belts may not exhibit prominent natural levee or splay forms. Flood plains of broad valleys may contain one or more abandoned meander belts in addition to the zone flanking the active stream channel.

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.

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.

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).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

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	more 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.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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:

Impermeable	less than 0.0015 inch
Very slow	0.0015 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	more than 20 inches

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

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

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

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

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

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	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

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.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

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.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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.

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:

Level to very gently sloping	0 to 2 percent
Gently sloping or moderately sloping	2 to 5 percent
Strongly sloping	5 to 11 percent
Moderately steep	11 to 17 percent
Steep	17 to 30 percent
Very steep	30 percent and higher

Classes for complex slopes are as follows:

Level to gently undulating	0 to 2 percent
Undulating or gently rolling	2 to 5 percent
Rolling	5 to 11 percent
Hilly	11 to 17 percent
Steep	17 to 30 percent
Very steep	30 percent and higher

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

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	more 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 and by the passage 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 rock 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.

Stream terrace. A platform or a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream and representing the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from 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."

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.

Topography. The relative position and elevations of the natural or manmade features of an area that describe the configuration of its surface.

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.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

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.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Blair, Nebraska)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	30.5	10.3	20.4	60	-19	0	0.61	0.24	1.05	2	5.5
February---	35.5	15.4	25.5	67	-14	1	.82	.31	1.35	1	6.0
March------	47.7	26.7	37.2	81	-1	26	2.52	.89	4.03	4	4.9
April------	62.9	39.4	51.1	89	18	143	2.65	1.07	3.98	5	.6
May--------	73.5	50.2	61.8	93	30	376	3.89	2.41	5.23	6	.0
June-------	82.4	60.1	71.2	99	43	636	4.30	2.54	5.88	6	.0
July-------	86.8	65.0	75.9	100	49	800	3.44	1.36	5.18	5	.0
August-----	84.1	61.8	73.0	99	45	708	3.30	1.66	4.73	5	.0
September--	75.4	52.6	64.0	94	32	425	3.76	1.47	5.68	5	.0
October----	65.0	40.6	52.8	88	21	166	2.36	.69	3.86	3	.3
November---	48.8	28.1	38.4	74	3	20	1.28	.40	2.15	2	2.0
December---	33.9	15.1	24.5	63	-14	1	.96	.33	1.47	2	6.0
Yearly:											
Average---	60.5	38.8	49.6	---	---	---	---	---	---	---	---
Extreme---	---	---	---	102	-20	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,301	29.90	24.63	34.75	46	25.3

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

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Blair, 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. 21	Apr. 26	May 10
2 years in 10 later than--	Apr. 15	Apr. 21	May 5
5 years in 10 later than--	Apr. 3	Apr. 11	Apr. 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 16	Oct. 3	Sept. 23
2 years in 10 earlier than--	Oct. 21	Oct. 8	Sept. 28
5 years in 10 earlier than--	Oct. 31	Oct. 18	Oct. 7

Table 3.--Growing Season

(Recorded in the period 1961-90 at Blair, 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	184	166	144
8 years in 10	192	174	150
5 years in 10	209	189	162
2 years in 10	226	204	175
1 year in 10	235	211	181

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

Map symbol	Soil name	Acres	Percent
1074	Albaton silty clay, drained, 0 to 2 percent slopes, occasionally flooded	2,813	1.1
1075	Albaton silty clay, depressional, 0 to 1 percent slopes, frequently flooded	767	0.3
1090	Alcester silt loam, 2 to 5 percent slopes	8,995	3.6
1432	Belfore silty clay loam, 0 to 2 percent slopes	2,219	0.9
1436	Belfore silty clay loam, terrace, 0 to 2 percent slopes	595	0.2
1594	Blyburg silty clay loam, 0 to 2 percent slopes, rarely flooded	389	0.2
1859	Burchard clay loam, 6 to 12 percent slopes, eroded	885	0.4
1879	Burchard-Steinauer clay loams, 12 to 18 percent slopes, eroded	5,476	2.2
2030	Cass fine sandy loam, 0 to 2 percent slopes, occasionally flooded	644	0.3
2041	Cass loam, 0 to 2 percent slopes, occasionally flooded	1,000	0.4
2192	Cooper silty clay loam, 0 to 2 percent slopes, rarely flooded	2,610	1.0
2320	Crofton silt loam, 11 to 17 percent slopes, eroded	282	0.1
2322	Crofton silt loam, 17 to 30 percent slopes, eroded	502	0.2
2855	Fluvaquents, sandy, 0 to 1 percent slopes, frequently flooded	16	*
2863	Fluvaquents, silty, 0 to 1 percent slopes, frequently flooded	728	0.3
2890	Forney silt loam, overwash, 0 to 2 percent slopes, rarely flooded	2,341	0.9
3150	Grable silt loam, 0 to 2 percent slopes, occasionally flooded	551	0.2
3410	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded	5,163	2.0
3812	Ida silt loam, 5 to 11 percent slopes, eroded	3,391	1.3
3822	Ida silt loam, 17 to 30 percent slopes, eroded	10,552	4.2
3892	Inglewood loamy fine sand, 0 to 2 percent slopes, occasionally flooded	235	*
4112	Judson silty clay loam, 2 to 5 percent slopes	19,447	7.7
4230	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded	8,467	3.4
4287	Kezan silt loam, 0 to 2 percent slopes, occasionally flooded	2,074	0.8
4288	Kezan-Kennebec silt loams, drained, 0 to 2 percent slopes, occasionally flooded	6,376	2.5
4780	Luton silty clay, 0 to 2 percent slopes, rarely flooded	8,310	3.3
4956	Marshall silty clay loam, 0 to 2 percent slopes	11,354	4.5
4961	Marshall silty clay loam, 2 to 5 percent slopes	8,952	3.5
4974	Marshall-Pohocco silty clay loams, 5 to 11 percent slopes, eroded	16,760	6.6
5321	Monona silt loam, 2 to 5 percent slopes, eroded	3,762	1.5
5343	Monona-Ida silt loams, 17 to 30 percent slopes, eroded	2,954	1.2
5348	Monona-Pohocco complex, 5 to 11 percent slopes, eroded	5,502	2.2
5358	Moody silty clay loam, 2 to 5 percent slopes	17,310	6.9
5415	Moville silt loam, 0 to 2 percent slopes, rarely flooded	1,698	0.7
5493	Napier-Nodaway-Gullied land complex, 0 to 60 percent slopes	2,025	0.8
5575	Nora silty clay loam, 5 to 11 percent slopes, eroded	25,394	10.1
5583	Nora-Crofton complex, 11 to 17 percent slopes, eroded	1,461	0.6
5800	Omadi silt loam, 0 to 2 percent slopes, rarely flooded	2,323	0.9
5814	Onawa silty clay, 0 to 2 percent slopes, occasionally flooded	3,021	1.2
5815	Onawa silty clay loam, 0 to 2 percent slopes, occasionally flooded	1,474	0.6
6075	Percival silty clay, 0 to 2 percent slopes, occasionally flooded	128	*
6133	Platte loam, 0 to 2 percent slopes, occasionally flooded	957	0.4
6164	Pohocco-Monona complex, 11 to 17 percent slopes, eroded	18,323	7.3
6178	Pohocco-Ida complex, 11 to 17 percent slopes, eroded	13,133	5.2
6490	Salix silty clay loam, 0 to 2 percent slopes, rarely flooded	1,347	0.5
6660	Sarpy fine sand, 0 to 2 percent slopes, occasionally flooded	346	0.1
6670	Sarpy loamy fine sand, 0 to 2 percent slopes, occasionally flooded	910	0.4
6906	Shell silt loam, 0 to 2 percent slopes, occasionally flooded	1,588	0.6
8166	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	3,490	1.4
8503	Monona silt loam, bench, 0 to 2 percent slopes	3,762	1.5
8504	Monona silt loam, bench, 2 to 5 percent slopes	2,017	0.8
8505	Fontanelle silty clay loam, depressional, 0 to 1 percent slopes, frequently flooded	185	*
8507	Onawet silty clay, depressional, 0 to 1 percent slopes, frequently flooded	401	0.2
8508	Onawa-Haynie complex, 0 to 2 percent slopes, occasionally flooded	1,802	0.7
8510	Wathena fine sandy loam, 0 to 2 percent slopes, occasionally flooded	944	0.4
8511	Wathena fine sandy loam, 0 to 2 percent slopes, rarely flooded	157	*

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
8512	Gullied land-Napier complex, 5 to 60 percent slopes	992	0.4
9900	Arents, earthen dams	18	*
9980	Mine or Quarry	469	0.2
9990	Aquolls	6	*
9995	Miscellaneous water, sewage lagoon	29	*
9998	Water	2,473	1.0
	Total	252,295	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops

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

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Soybeans	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
1074: Albaton, occasionally flooded	3w	3w	---	---	100	137	34	---
1075: Albaton, depressional, occasionally flooded	5w	---	---	---	---	---	---	---
1090: Alcester	2e	3e	3.9	6.0	85	150	33	45
1432: Belfore	1	1	3.9	6.0	85	140	36	48
1436: Belfore	1	1	4.2	5.5	85	125	32	40
1594: Blyburg, rarely flooded	1	1	4.5	---	105	140	38	---
1859: Burchard, eroded	3e	4e	2.6	---	56	70	20	---
1879: Burchard, eroded	4e	---	2.1	---	40	---	---	---
Steinauer, eroded	6e	---	---	---	---	---	---	---
2030: Cass, occasionally flooded	2w	2w	4.0	6.2	67	135	---	---
2041: Cass, occasionally flooded	2w	2w	4.0	6.2	67	135	---	---
2192: Cooper, rarely flooded	2w	2w	---	---	126	---	42	---
2320: Crofton, eroded	4e	---	2.4	---	55	---	---	---
2322: Crofton, eroded	6e	---	---	---	---	---	---	---
2855: Fluvaquents, sandy, frequently flooded	8w	---	---	---	---	---	---	---
2863: Fluvaquents, silty, frequently flooded	8w	---	---	---	---	---	---	---
2890: Forney, rarely flooded	2w	2w	---	---	105	---	32	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Soybeans	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
3150:								
Grable, occasionally flooded	2s	1	---	---	103	---	35	---
3410:								
Haynie, occasionally flooded	2w	2w	---	---	126	162	42	---
3812:								
Ida, eroded	3e	4e	---	---	124	---	42	---
3822:								
Ida, eroded	6e	---	---	---	85	---	---	---
3892:								
Inglewood, rarely flooded	4e	3e	---	---	35	90	18	25
4112:								
Judson	2e	3e	4.8	6.4	110	135	50	52
4230:								
Kennebec, occasionally flooded	2w	2w	---	---	162	---	54	---
4287:								
Kezan, occasionally flooded	4w	---	---	---	50	---	35	---
4288:								
Kezan, occasionally flooded	3w	3w	4.5	6.5	100	110	40	45
Kennebec, occasionally flooded	2w	---	---	---	162	---	54	---
4780:								
Luton, rarely flooded	3w	3w	---	---	80	---	27	---
4956:								
Marshall	1	1	5.0	---	115	155	46	56
4961:								
Marshall	2e	3e	5.0	---	100	130	38	42
4974:								
Marshall, eroded	3e	4e	4.5	---	95	110	30	35
Pohocco, eroded	3e	4e	---	---	90	110	30	32
5321:								
Monona	2e	3e	5.0	6.2	110	140	36	42
5343:								
Monona, eroded	6e	---	---	---	---	---	---	---
Ida, eroded	6e	---	---	---	85	---	---	---
5348:								
Monona, eroded	3e	4e	4.5	5.8	95	115	30	34
Pohocco, eroded	3e	4e	---	---	90	110	30	32

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Soybeans	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
5358:								
Moody	2e	3e	4.0	5.9	80	130	30	34
5415:								
Moville, rarely flooded	2w	2w	---	---	127	150	43	55
5493:								
Napier	3e	4e	---	---	125	140	42	---
Nodaway, occasionally flooded	6w	---	---	---	---	---	---	---
Gullied land	7e	---	---	---	---	---	---	---
5575:								
Nora, eroded	3e	4e	3.1	4.0	64	115	23	---
5583:								
Nora, eroded	4e	---	2.4	---	38	---	12	---
Crofton, eroded	4e	---	2.0	---	50	---	---	---
5800:								
Omadi, rarely flooded	1	1	4.8	6.5	110	135	40	50
5814:								
Onawa, occasionally flooded	2w	2w	---	---	120	147	40	---
5815:								
Onawa, occasionally flooded	2w	2w	---	---	120	147	40	---
6075:								
Percival, occasionally flooded	2w	2w	---	---	100	120	34	40
6133:								
Platte, occasionally flooded	4w	4w	2.0	4.0	40	85	18	26
6164:								
Pohocco, eroded	4e	---	---	---	72	---	24	---
Monona, eroded	4e	---	---	---	78	---	---	---
6178:								
Pohocco, eroded	4e	---	---	---	72	---	24	---
Ida, eroded	4e	---	---	---	98	---	33	---
6490:								
Salix, rarely flooded	1	1	---	---	145	---	49	---
6660:								
Sarpy, occasionally flooded	4s	3s	---	4.0	35	60	18	---
6670:								
Sarpy, occasionally flooded	4s	3s	---	4.0	35	60	18	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability N	Land capability I	Alfalfa hay N	Alfalfa hay I	Corn N	Corn I	Soybeans N	Soybeans I
			Tons	Tons	Bu	Bu	Bu	Bu
6906:								
Shell, occasionally flooded	2w	2w	4.0	6.2	88	139	36	44
8166:								
Zook, occasionally flooded	2w	---	3.8	---	126	---	42	---
8503:								
Monona	1	1	5.0	6.5	115	155	46	56
8504:								
Monona	2e	3e	5.0	6.2	110	140	36	42
8505:								
Fontanelle, depressional, frequently flooded	5w	5w	---	---	---	---	---	---
8507:								
Onawet, depressional, frequently flooded	5w	---	---	---	100	---	34	---
8508:								
Onawa, occasionally flooded	2w	2w	---	---	120	147	40	---
Haynie, occasionally flooded	2w	2w	---	---	126	162	42	---
8510:								
Wathena, occasionally flooded	4w	---	---	4.0	35	60	18	---
8511:								
Wathena, rarely flooded	4w	---	---	4.0	35	60	18	---
8512:								
Gullied land	7e	---	---	---	---	---	---	---
Napier	3e	---	---	---	116	---	39	---
9900:								
Arents, earthen dams	8	---	---	---	---	---	---	---
9980:								
Mine or Quarry	8s	---	---	---	---	---	---	---
9990:								
Aquolls	5w	---	---	---	---	---	---	---
9995.								
Miscellaneous water								
9998.								
Water								

Table 6.--Capability Class and Subclass

(Water areas are excluded. Absence of an entry indicates no acreage)

Capability class	Capability subclass	Acreage
1	---	17,145
2	e	52,288
2	w	30,081
2	s	413
3	e	46,676
3	w	10,911
4	e	32,784
4	w	2,859
4	s	994
5	w	1,001
6	e	15,342
6	w	608
7	e	1,104
8	---	18
8	w	744
8	s	469

Table 7.--Prime Farmland

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

Map symbol	Soil name
1090	Alcester silt loam, 2 to 5 percent slopes
1432	Belfore silty clay loam, 0 to 2 percent slopes
1436	Belfore silty clay loam, terrace, 0 to 2 percent slopes
1594	Blyburg silty clay loam, 0 to 2 percent slopes, rarely flooded
2030	Cass fine sandy loam, 0 to 2 percent slopes, occasionally flooded
2041	Cass loam, 0 to 2 percent slopes, occasionally flooded
2192	Cooper silty clay loam, 0 to 2 percent slopes, rarely flooded
2890	Forney silt loam, overwash, 0 to 2 percent slopes, rarely flooded (where drained)
3150	Grable silt loam, 0 to 2 percent slopes, occasionally flooded
3410	Haynie silt loam, 0 to 2 percent slopes, occasionally flooded
4112	Judson silty clay loam, 2 to 5 percent slopes
4230	Kennebec silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
4288	Kezan-Kennebec silt loams, drained, 0 to 2 percent slopes, occasionally flooded (where drained)
4956	Marshall silty clay loam, 0 to 2 percent slopes
4961	Marshall silty clay loam, 2 to 5 percent slopes
5321	Monona silt loam, 2 to 5 percent slopes, eroded
5358	Moody silty clay loam, 2 to 5 percent slopes
5415	Moville silt loam, 0 to 2 percent slopes, rarely flooded
5800	Omadi silt loam, 0 to 2 percent slopes, rarely flooded
5814	Onawa silty clay, 0 to 2 percent slopes, occasionally flooded (where drained)
5815	Onawa silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained)
6075	Percival silty clay, 0 to 2 percent slopes, occasionally flooded (where drained)
6490	Salix silty clay loam, 0 to 2 percent slopes, rarely flooded
6906	Shell silt loam, 0 to 2 percent slopes, occasionally flooded
8166	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained)
8503	Monona silt loam, bench, 0 to 2 percent slopes
8504	Monona silt loam, bench, 2 to 5 percent slopes
8508	Onawa-Haynie complex, 0 to 2 percent slopes, occasionally flooded (where drained)
8510	Wathena fine sandy loam, 0 to 2 percent slopes, occasionally flooded (where drained)
8511	Wathena fine sandy loam, 0 to 2 percent slopes, rarely flooded

Table 8.--Windbreaks and Environmental Plantings

(Only the soils that are suitable for windbreaks and environmental plantings are listed. 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
1074: Albaton, occasionally flooded	American plum; gray dogwood	Siberian peashrub	Eastern redcedar; Russian-olive	Black willow; bur oak; common hackberry; green ash; honeylocust	Eastern cottonwood
1090: Alcester	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
1432: Belfore	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
1436: Belfore	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
1594: Blyburg, rarely flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple

Table 8.--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
1859:					
Burchard, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
1879:					
Burchard, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Steinauer, eroded	American plum; fragrant sumac; silver buffaloberry; skunkbush sumac	---	Bur oak; common hackberry; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; ponderosa pine; Russian-olive	---	---
2030:					
Cass, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple

Table 8.--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
2041: Cass, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
2192: Cooper, rarely flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
2320: Crofton, eroded	American plum; fragrant sumac; silver buffaloberry; skunkbush sumac	---	Bur oak; common hackberry; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; ponderosa pine; Russian-olive	---	---
2890: Forney, rarely flooded	American plum; redosier dogwood	---	Boxelder; eastern redcedar; Russian-olive	Black willow; bur oak; green ash; honeylocust; pin oak; silver maple; white willow	Eastern cottonwood

Table 8.--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
3150: Grable, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
3410: Haynie, occasionally flooded	---	American plum; common chokecherry; fragrant sumac	Bur oak; eastern redcedar	Black locust; green ash; honeylocust; ponderosa pine	Eastern cottonwood
3812: Ida, eroded	American plum; fragrant sumac; silver buffaloberry; skunkbush sumac	---	Bur oak; common hackberry; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; ponderosa pine; Russian-olive	---	---
3892: Inglewood, rarely flooded	---	---	Blue spruce; bur oak; common hackberry; eastern redcedar; Russian-olive; Washington hawthorn	Austrian pine; black locust; eastern white pine; green ash; honeylocust; jack pine; ponderosa pine; Scotch pine	---
4112: Judson	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---

Table 8.--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
4230:					
Kennebec, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
4287:					
Kezan, occasionally flooded	American plum; gray dogwood; redosier dogwood	---	Boxelder; eastern redcedar; Russian-olive	Black willow; bur oak; green ash; honeylocust; pin oak; silver maple; white willow	Eastern cottonwood
4288:					
Kezan, occasionally flooded	American plum; gray dogwood; redosier dogwood	---	Boxelder; eastern redcedar; Russian-olive	Black willow; bur oak; green ash; honeylocust; pin oak; silver maple; white willow	Eastern cottonwood
Kennebec, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
4780:					
Luton, rarely flooded	American plum; gray dogwood; redosier dogwood	---	Boxelder; eastern redcedar; Russian-olive	Black willow; bur oak; green ash; honeylocust; pin oak; silver maple; white willow	Eastern cottonwood

Table 8.--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
4956:					
Marshall	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
4961:					
Marshall	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
4974:					
Marshall, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Pohocco, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
5321:					
Monona	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---

Table 8.--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
5348:					
Monona, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Pohocco, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
5358:					
Moody	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
5415:					
Moville, rarely flooded	---	American plum; common chokecherry; fragrant sumac	Bur oak; eastern redcedar	Black locust; green ash; honeylocust; ponderosa pine	Eastern cottonwood
5493:					
Napier	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Nodaway, occasionally flooded.					
Gullied land.					

Table 8.--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
5575: Nora, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
5583: Nora, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Crofton, eroded	American plum; fragrant sumac; silver buffaloberry; skunkbush sumac	---	Bur oak; common hackberry; eastern redcedar; green ash; honeylocust; northern catalpa; osageorange; ponderosa pine; Russian-olive	---	---
5800: Omadi, rarely flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
5814: Onawa, occasionally flooded	American plum	---	Eastern redcedar; Russian-olive; Washington hawthorn	Black willow; bur oak; green ash; honeylocust	---

Table 8.--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
5815:					
Onawa, occasionally flooded	American plum	---	Eastern redcedar; Russian-olive; Washington hawthorn	Black willow; bur oak; green ash; honeylocust	---
6075:					
Percival, occasionally flooded	American plum	---	Eastern redcedar; Russian-olive; Washington hawthorn	Black willow; bur oak; green ash; honeylocust	---
6133:					
Platte, occasionally flooded	American plum	---	Eastern redcedar; Russian-olive; Washington hawthorn	Black willow; bur oak; green ash; honeylocust	---
6164:					
Pohocco, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Monona, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
6178:					
Pohocco, eroded	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
Ida, eroded	American plum; Siberian peashrub; silver buffaloberry	Eastern redcedar; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian-olive	Siberian elm	---

Table 8.--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
6490: Salix, rarely flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
6660: Sarpy, occasionally flooded	American plum; common chokecherry; silver buffaloberry; skunkbush sumac	Eastern redcedar	Austrian pine; jack pine; ponderosa pine; Scotch pine	---	---
6670: Sarpy, occasionally flooded	American plum; common chokecherry; silver buffaloberry; skunkbush sumac	Eastern redcedar	Austrian pine; jack pine; ponderosa pine; Scotch pine	---	---
6906: Shell, occasionally flooded	Gray dogwood; hazelnut; Peking cotoneaster	American plum; common chokecherry; fragrant sumac; Nanking cherry; redosier dogwood	Bur oak; eastern redcedar; northern red oak; Washington hawthorn	Austrian pine; black cherry; black walnut; eastern white pine; green ash; honeylocust; jack pine; Norway spruce; pin oak; ponderosa pine; shagbark hickory	Silver maple
8166: Zook, occasionally flooded	American plum; gray dogwood; redosier dogwood	---	Boxelder; eastern redcedar; Russian-olive	Black willow; bur oak; green ash; honeylocust; pin oak; silver maple; white willow	Eastern cottonwood

Table 8.--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
8503:					
Monona	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
8504:					
Monona	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---
8508:					
Onawa, occasionally flooded	American plum	---	Eastern redcedar; Russian-olive; Washington hawthorn	Black willow; bur oak; green ash; honeylocust	---
Haynie, occasionally flooded	---	American plum; common chokecherry; fragrant sumac	Bur oak; eastern redcedar	Black locust; green ash; honeylocust; ponderosa pine	Eastern cottonwood
8510:					
Wathena, occasionally flooded	---	American plum; common chokecherry; fragrant sumac	Bur oak; eastern redcedar	Black locust; green ash; honeylocust; ponderosa pine	Eastern cottonwood
8511:					
Wathena, rarely flooded	---	American plum; common chokecherry; fragrant sumac	Bur oak; eastern redcedar	Black locust; green ash; honeylocust; ponderosa pine	Eastern cottonwood

Table 8.--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
8512:					
Gullied land.					
Napier	Fragrant sumac; gray dogwood; hazelnut; Peking cotoneaster; redosier dogwood	Autumn-olive; common chokecherry	Black walnut; bur oak; eastern redcedar; eastern white pine; green ash; northern red oak; Washington hawthorn	Black locust; jack pine; Norway spruce; ponderosa pine; Scotch pine; silver maple	---

Table 9a.--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
1074:							
Albaton, occasionally flooded	87	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	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00			Flooding	0.60
1075:							
Albaton, depressional, frequently flooded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Restricted permeability	1.00
		Flooding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Restricted permeability	1.00	Flooding	1.00
		Restricted permeability	1.00	Too clayey	1.00	Ponding	1.00
		Too clayey	1.00	Flooding	0.40	Too clayey	1.00
1090:							
Alcester	90	Not limited		Not limited		Somewhat limited	
						Slope	0.28
1432:							
Belfore	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.45	Restricted permeability	0.45	Restricted permeability	0.45
1436:							
Belfore	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.45	Restricted permeability	0.45	Restricted permeability	0.45
1594:							
Blyburg, rarely flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.21	Restricted permeability	0.21
		Restricted permeability	0.21				
1859:							
Burchard, eroded	90	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

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
1879:							
Burchard, eroded----	50	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, eroded---	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
2030:							
Cass, occasionally flooded-----------	90	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
2041:							
Cass, occasionally flooded-----------	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
2192:							
Cooper, rarely flooded-----------	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Depth to saturated zone	0.19	Depth to saturated zone	0.39
		Depth to saturated zone	0.39				
2320:							
Crofton, eroded-----	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
2322:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
2855:							
Fluvaquents, sandy, frequently flooded	100	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	1.00	Too sandy	0.91	Flooding	1.00
		Too sandy	0.91	Flooding	0.40	Too sandy	0.91
2863:							
Fluvaquents, silty, frequently flooded	100	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	1.00	Flooding	0.40	Flooding	1.00
2890:							
Forney, rarely flooded-----------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00				

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
3150:							
Grable, occasionally flooded	75	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
3410:							
Haynie, occasionally flooded	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
3812:							
Ida, eroded	90	Not limited		Not limited		Very limited	
						Slope	1.00
3822:							
Ida, eroded	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
3892:							
Inglewood, rarely flooded	90	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.37	Flooding	0.60
		Too sandy	0.37			Too sandy	0.37
4112:							
Judson	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	0.28
						Restricted permeability	0.21
4230:							
Kennebec, occasionally flooded	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
4287:							
Kezan, occasionally flooded	70	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	1.00			Flooding	0.60
4288:							
Kezan, occasionally flooded	35	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07
Kennebec, occasionally flooded	35	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
4780:							
Luton, rarely flooded	75	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	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00				
4956:							
Marshall	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
4961:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	0.28
						Restricted permeability	0.21
4974:							
Marshall, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	1.00
						Restricted permeability	0.21
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	1.00
						Restricted permeability	0.21
5321:							
Monona	90	Not limited		Not limited		Somewhat limited	
						Slope	0.28
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Ida, eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5348:							
Monona, eroded	55	Not limited		Not limited		Very limited	
						Slope	1.00
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.21	Restricted permeability	0.21	Slope	1.00
						Restricted permeability	0.21
5358:							
Moody	90	Not limited		Not limited		Somewhat limited	
						Slope	0.28

Table 9a.--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
5415:							
Moville, rarely flooded-----------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00				
5493:							
Napier--------------	40	Not limited		Not limited		Very limited	
						Slope	1.00
Nodaway, occasionally flooded-----------	30	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
Gullied land--------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5575:							
Nora, eroded--------	85	Not limited		Not limited		Very limited	
						Slope	1.00
5583:							
Nora, eroded--------	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
Crofton, eroded-----	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
5800:							
Omadi, rarely flooded------------	75	Very limited		Not limited		Not limited	
		Flooding	1.00				
5814:							
Onawa, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07
5815:							
Onawa, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07
6133:							
Platte, occasionally flooded	55	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07
6164:							
Pohocco, eroded	57	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
Monona, eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
6178:							
Pohocco, eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Restricted permeability	0.21	Restricted permeability	0.21	Restricted permeability	0.21
Ida, eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
6490:							
Salix, rarely flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.21	Restricted permeability	0.21
		Restricted permeability	0.21				
6660:							
Sarpy, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Too sandy	1.00	Too sandy	1.00
		Too sandy	1.00			Flooding	0.60
6670:							
Sarpy, occasionally flooded	75	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.49	Flooding	0.60
		Too sandy	0.49			Too sandy	0.49
6906:							
Shell, occasionally flooded	95	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
8166:							
Zook, occasionally flooded	80	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	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00			Flooding	0.60
8503:							
Monona	85	Not limited		Not limited		Not limited	
8504:							
Monona	80	Not limited		Not limited		Somewhat limited	
						Slope	0.28
8505:							
Fontanelle, depressional, frequently flooded	85	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	Restricted permeability	0.83	Ponding	1.00
		Restricted permeability	0.83	Flooding	0.40	Restricted permeability	0.83
8507:							
Onawet, depressional, frequently flooded	75	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	Restricted permeability	1.00	Ponding	1.00
		Restricted permeability	1.00	Too clayey	1.00	Restricted permeability	1.00
		Too clayey	1.00	Flooding	0.40	Too clayey	1.00
8508:							
Onawa, occasionally flooded	50	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Too clayey	1.00	Too clayey	1.00
		Too clayey	1.00	Depth to saturated zone	0.03	Flooding	0.60
		Depth to saturated zone	0.07			Depth to saturated zone	0.07
Haynie, occasionally flooded	30	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
8510:							
Wathena, occasionally flooded	80	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
8511:							
Wathena, rarely flooded-----------	80	Very limited		Not limited		Not limited	
		Flooding	1.00				
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Napier--------------	40	Not limited		Not limited		Very limited	
						Slope	1.00
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9998:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 9b.--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	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
1074:							
Albaton, occasionally flooded	87	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	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
1075:							
Albaton, depressional, frequently flooded	70	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
1090:							
Alcester	90	Not limited		Not limited		Not limited	
1432:							
Belfore	80	Not limited		Not limited		Not limited	
1436:							
Belfore	85	Not limited		Not limited		Not limited	
1594:							
Blyburg, rarely flooded	85	Not limited		Not limited		Not limited	
1859:							
Burchard, eroded	90	Not limited		Not limited		Somewhat limited	
						Slope	0.04
1879:							
Burchard, eroded	50	Not limited		Not limited		Very limited	
						Slope	1.00
Steinauer, eroded	45	Not limited		Not limited		Very limited	
						Slope	1.00
2030:							
Cass, occasionally flooded	90	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
2041:							
Cass, occasionally flooded	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
2192:							
Cooper, rarely flooded-----------	90	Not limited		Not limited		Somewhat limited	
						Depth to saturated zone	0.19
2320:							
Crofton, eroded-----	85	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.96
2322:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00	Slope	1.00
		Slope	0.95				
2855:							
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Too sandy	0.91	Too sandy	0.91	Depth to saturated zone	1.00
		Flooding	0.40	Flooding	0.40	Droughty	0.06
2863:							
Fluvaquents, silty, frequently flooded	100	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
2890:							
Forney, rarely 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
3150:							
Grable, occasionally flooded-----------	75	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
3410:							
Haynie, occasionally flooded-----------	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
3812:							
Ida, eroded---------	90	Not limited		Not limited		Not limited	
3822:							
Ida, eroded---------	90	Somewhat limited		Not limited		Very limited	
		Slope	0.95			Slope	1.00
3892:							
Inglewood, rarely flooded-----------	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.37	Too sandy	0.37	Flooding	0.60
						Droughty	0.22

Table 9b.--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
4112:							
Judson	80	Not limited		Not limited		Not limited	
4230:							
Kennebec, occasionally flooded	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
4287:							
Kezan, occasionally flooded	70	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
4288:							
Kezan, occasionally flooded	35	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Depth to saturated zone	0.03
Kennebec, occasionally flooded	35	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
4780:							
Luton, rarely flooded	75	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	1.00	Too clayey	1.00	Too clayey	1.00
4956:							
Marshall	75	Not limited		Not limited		Not limited	
4961:							
Marshall	90	Not limited		Not limited		Not limited	
4974:							
Marshall, eroded	55	Not limited		Not limited		Not limited	
Pohocco, eroded	35	Not limited		Not limited		Not limited	
5321:							
Monona	90	Not limited		Not limited		Not limited	
5343:							
Monona, eroded	60	Somewhat limited		Not limited		Very limited	
		Slope	0.95			Slope	1.00
Ida, eroded	40	Somewhat limited		Not limited		Very limited	
		Slope	0.95			Slope	1.00
5348:							
Monona, eroded	55	Not limited		Not limited		Not limited	
Pohocco, eroded	35	Not limited		Not limited		Not limited	

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
5358:							
Moody	90	Not limited		Not limited		Not limited	
5415:							
Moville, rarely flooded	85	Not limited		Not limited		Not limited	
5493:							
Napier	40	Not limited		Not limited		Not limited	
Nodaway, occasionally flooded	30	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
Gullied land	30	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Slope	1.00
		Water erosion	1.00	Slope	1.00		
5575:							
Nora, eroded	85	Not limited		Not limited		Not limited	
5583:							
Nora, eroded	55	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.96
Crofton, eroded	35	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.96
5800:							
Omadi, rarely flooded	75	Not limited		Not limited		Not limited	
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
						Depth to saturated zone	0.03
5815:							
Onawa, occasionally flooded	75	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Depth to saturated zone	0.03
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
						Depth to saturated zone	0.03
						Droughty	0.01

Table 9b.--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
6133:							
Platte, occasionally flooded-----------	55	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
						Depth to saturated zone	0.03
						Droughty	0.01
6164:							
Pohocco, eroded-----	57	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.96
Monona, eroded------	40	Not limited		Not limited		Somewhat limited	
						Slope	0.96
6178:							
Pohocco, eroded-----	50	Very limited		Very limited		Somewhat limited	
		Water erosion	1.00	Water erosion	1.00	Slope	0.96
Ida, eroded---------	30	Not limited		Not limited		Somewhat limited	
						Slope	0.96
6490:							
Salix, rarely flooded-----------	80	Not limited		Not limited		Not limited	
6660:							
Sarpy, occasionally flooded-----------	90	Very limited		Very limited		Somewhat limited	
		Too sandy	1.00	Too sandy	1.00	Droughty	0.64
						Flooding	0.60
6670:							
Sarpy, occasionally flooded-----------	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.49	Too sandy	0.49	Flooding	0.60
						Droughty	0.48
6906:							
Shell, occasionally flooded-----------	95	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
8166:							
Zook, occasionally flooded-----------	80	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
8503:							
Monona--------------	85	Not limited		Not limited		Not limited	
8504:							
Monona--------------	80	Not limited		Not limited		Not limited	

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
8505:							
Fontanelle, depressional, frequently flooded	85	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
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
8507:							
Onawet, depressional, frequently flooded	75	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
8508:							
Onawa, occasionally flooded------------	50	Very limited		Very limited		Very limited	
		Too clayey	1.00	Too clayey	1.00	Too clayey	1.00
						Flooding	0.60
						Depth to saturated zone	0.03
Haynie, occasionally flooded------------	30	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
8510:							
Wathena, occasionally flooded------------	80	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
8511:							
Wathena, rarely flooded------------	80	Not limited		Not limited		Not limited	
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Water erosion	1.00	Slope	1.00
		Water erosion	1.00	Slope	1.00		
Napier--------------	40	Not limited		Not limited		Not limited	
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	

Table 9b.--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
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 10.--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: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1074: Albaton, occasionally flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
1075: Albaton, depressional, frequently flooded	Very poor	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good	Poor
1090: Alcester	Good	Good	Good	Good	Very poor	---	Very poor	Very poor	Good	Very poor	Very poor	Good
1432: Belfore	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
1436: Belfore	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
1594: Blyburg, rarely flooded	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
1859: Burchard, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
1879: Burchard, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Steinauer, eroded	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
2030: Cass, occasionally flooded	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
2041: Cass, occasionally flooded	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
2192: Cooper, rarely flooded	Good	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair	---
2320: Crofton, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
2322: Crofton, eroded	Poor	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
2855: Fluvaquents, sandy, frequently flooded	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good	Very poor
2863: Fluvaquents, silty, frequently flooded	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good	Very poor
2890: Forney, rarely flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
3150: Grable, occasionally flooded	Good	Good	Good	Good	Fair	---	Poor	Very poor	Good	Good	Very poor	---
3410: Haynie, occasionally flooded	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
3812: Ida, eroded	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
3822: Ida, eroded	Poor	Fair	Good	Poor	Poor	---	Very poor	Very poor	Fair	Fair	Very poor	---
3892: Inglewood, rarely flooded	Poor	Fair	Good	Fair	Fair	Good	Poor	Very poor	Fair	Poor	Very poor	Good
4112: Judson	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
4230: Kennebec, occasionally flooded	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
4287: Kezan, occasionally flooded	Poor	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good	Fair
4288: Kezan, occasionally flooded	Fair	Fair	Good	Good	Good	Good	Good	Fair	Fair	Good	Fair	Good
Kennebec, occasionally flooded	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
4780: Luton, rarely flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
4956: Marshall	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
4961:												
Marshall	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
4974:												
Marshall, eroded	Poor	Fair	Good	Good	Good	---	Very poor	Very poor	Fair	Good	Very poor	---
Pohocco, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
5321:												
Monona	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
5343:												
Monona, eroded	Poor	Fair	Good	Fair	Fair	---	Very poor	Very poor	Fair	Fair	Very poor	---
Ida, eroded	Poor	Fair	Good	Poor	Poor	---	Very poor	Very poor	Fair	Fair	Very poor	---
5348:												
Monona, eroded	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
Pohocco, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
5358:												
Moody	Good	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
5415:												
Moville, rarely flooded	Good	Good	Good	---	---	---	Good	Good	Good	Good	Good	---
5493:												
Napier	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
Nodaway, occasionally flooded	Poor	Fair	Fair	Fair	Poor	---	Fair	Fair	Fair	Fair	Poor	---
Gullied land	Very poor	Very poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Poor	Very poor	Fair
5575:												
Nora, eroded	Fair	Good	Good	Good	Very poor	---	Very poor	Very poor	Good	Very poor	Very poor	Good
5583:												
Nora, eroded	Poor	Good	Good	Good	Very poor	---	Very poor	Very poor	Fair	Very poor	Very poor	Good
Crofton, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor	Good
5800:												
Omadi, rarely flooded	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
5814:												
Onawa, occasionally flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
5815:												
Onawa, occasionally flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
6075:												
Percival, occasionally flooded	Fair	Fair	Fair	Fair	Poor	---	Fair	Fair	Fair	Fair	Fair	---
6133:												
Platte, occasionally flooded	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Good	Fair	Good	Fair	Fair
6164:												
Pohocco, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Monona, eroded	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
6178:												
Pohocco, eroded	Fair	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor	Good
Ida, eroded	Fair	Good	Good	Fair	Fair	---	Very poor	Very poor	Good	Fair	Very poor	---
6490:												
Salix, rarely flooded	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
6660:												
Sarpy, occasionally flooded	Poor	Poor	Fair	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
6670:												
Sarpy, occasionally flooded	Poor	Poor	Fair	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
6906:												
Shell, occasionally flooded	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Fair	Very poor	Good
8166:												
Zook, occasionally flooded	Good	Fair	Good	Fair	Poor	---	Good	Good	Fair	Fair	Good	---
8503:												
Monona	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
8504:												
Monona	Good	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
8505:												
Fontanelle, depressional, frequently flooded	Poor	Poor	Fair	Fair	Fair	Fair	Good	Good	Poor	Fair	Good	Fair
8507:												
Onawet, depressional, occasionally flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
8508:												
Onawa, occasionally flooded	Fair	Fair	Fair	Poor	Very poor	---	Good	Good	Fair	Poor	Good	---
Haynie, occasionally flooded	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
8510:												
Wathena, occasionally flooded	Poor	Poor	Fair	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
8511:												
Wathena, rarely flooded	Poor	Poor	Fair	Poor	Poor	---	Very poor	Very poor	Poor	Poor	Very poor	---
8512:												
Gullied land	Very poor	Very poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Poor	Poor	Very poor	Fair
Napier	Fair	Good	Good	Good	Good	---	Very poor	Very poor	Good	Good	Very poor	---
9900.												
Arents, earthen dams												
9980.												
Mine or Quarry												
9990.												
Aquolls												
9995.												
Miscellaneous water												
9998.												
Water												

Table 11a.--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
1074:							
Albaton, occasionally flooded------------	87	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
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
1075:							
Albaton, depressional, frequently flooded	70	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
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
1090:							
Alcester------------	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.01			Shrink-swell	0.01
1432:							
Belfore-------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
1436:							
Belfore-------------	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
1594:							
Blyburg, rarely flooded------------	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
1859:							
Burchard, eroded----	90	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, eroded----	50	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, eroded---	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.32	Shrink-swell	0.32	Shrink-swell	0.32
2030:							
Cass, occasionally flooded------------	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
2041:							
Cass, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
2192:							
Cooper, rarely flooded-----------	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	0.39	Shrink-swell	1.00	Depth to saturated zone	0.39
2320:							
Crofton, eroded-----	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
2322:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
2855:							
Fluvaquents, sandy, frequently flooded	100	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
2863:							
Fluvaquents, silty, frequently flooded	100	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
2890:							
Forney, rarely flooded-----------	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
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
3150:							
Grable, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
3410:							
Haynie, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
3812:							
Ida, eroded---------	90	Not limited		Not limited		Very limited	
						Slope	1.00
3822:							
Ida, eroded---------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 11a.--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
3892:							
Inglewood, rarely flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
4112:							
Judson	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4230:							
Kennebec, occasionally flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
4287:							
Kezan, occasionally flooded	70	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
		Shrink-swell	0.01			Shrink-swell	0.01
4288:							
Kezan, occasionally flooded	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
		Shrink-swell	0.01			Shrink-swell	0.01
Kennebec, occasionally flooded	35	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
4780:							
Luton, rarely flooded	75	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
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
4956:							
Marshall	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
4961:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50

Table 11a.--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
4974:							
Marshall, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
						Shrink-swell	0.50
Pohocco, eroded	35	Somewhat limited		Not limited		Very limited	
		Shrink-swell	0.01			Slope	1.00
						Shrink-swell	0.01
5321:							
Monona	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.01			Shrink-swell	0.01
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.01			Shrink-swell	0.01
Ida, eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5348:							
Monona, eroded	55	Somewhat limited		Not limited		Very limited	
		Shrink-swell	0.01			Slope	1.00
						Shrink-swell	0.01
Pohocco, eroded	35	Somewhat limited		Not limited		Very limited	
		Shrink-swell	0.01			Slope	1.00
						Shrink-swell	0.01
5358:							
Moody	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
5415:							
Moville, rarely flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Shrink-swell	1.00		
				Depth to saturated zone	0.35		
5493:							
Napier	40	Not limited		Not limited		Very limited	
						Slope	1.00
Nodaway, occasionally flooded	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
Gullied land	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5575:							
Nora, eroded	85	Not limited		Not limited		Very limited	
						Slope	1.00

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
5583:							
Nora, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
Crofton, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
5800:							
Omadi, rarely flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
5815:							
Onawa, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
6133:							
Platte, occasionally flooded	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
6164:							
Pohocco, eroded	57	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Shrink-swell	0.01			Shrink-swell	0.01
Monona, eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Shrink-swell	0.01			Shrink-swell	0.01
6178:							
Pohocco, eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00
		Shrink-swell	0.01			Shrink-swell	0.01
Ida, eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Slope	1.00

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
6490:							
Salix, rarely flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.78	Depth to saturated zone	0.35	Shrink-swell	0.78
6660:							
Sarpy, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
6670:							
Sarpy, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
6906:							
Shell, occasionally flooded	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
8166:							
Zook, occasionally flooded	80	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
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
8503:							
Monona	85	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.01			Shrink-swell	0.01
8504:							
Monona	80	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.01			Shrink-swell	0.01
8505:							
Fontanelle, depressional, frequently flooded	85	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
8507:							
Onawet, depressional, frequently flooded	75	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

Table 11a.--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
8508:							
Onawa, occasionally flooded-----------	50	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.07	Depth to saturated zone	1.00	Depth to saturated zone	0.07
Haynie, occasionally flooded-----------	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
8510:							
Wathena, occasionally flooded------------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
8511:							
Wathena, rarely flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.35		
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Napier--------------	40	Not limited		Not limited		Very limited	
						Slope	1.00
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9998:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 11b.--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
1074:							
Albaton, occasionally flooded	87	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too clayey	1.00	Too clayey	1.00
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
1075:							
Albaton, depressional, frequently flooded	70	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Too clayey	0.88	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.80	Too clayey	1.00
		Flooding	1.00	Cutbanks cave	0.10		
1090:							
Alcester	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
1432:							
Belfore	80	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50	Too clayey	0.01		
		Frost action	0.50				
1436:							
Belfore	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50	Too clayey	0.01		
		Frost action	0.50				
1594:							
Blyburg, rarely flooded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Flooding	0.40				
1859:							
Burchard, eroded	90	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				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
1879:							
Burchard, eroded----	50	Very limited		Very limited		Very limited	
		Low strength	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Steinauer, eroded---	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
		Shrink-swell	0.32				
2030:							
Cass, occasionally flooded------------	90	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
		Frost action	0.50	Flooding	0.60		
2041:							
Cass, occasionally flooded------------	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
		Frost action	0.50	Flooding	0.60		
2192:							
Cooper, rarely flooded------------	90	Very limited		Very limited		Somewhat limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.19
		Frost action	1.00	Too clayey	0.50		
		Low strength	1.00	Cutbanks cave	0.10		
		Flooding	0.40				
		Depth to saturated zone	0.19				
2320:							
Crofton, eroded-----	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.96	Slope	0.96
		Slope	0.96	Cutbanks cave	0.10		
		Frost action	0.50				
2322:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
2855:							
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
						Depth to saturated zone	1.00
		Flooding	1.00	Cutbanks cave	1.00		
		Frost action	0.50	Flooding	0.80	Droughty	0.06

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
2863:							
Fluvaquents, silty, frequently flooded	100	Very limited		Very limited		Very limited	
		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
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
2890:							
Forney, rarely flooded	85	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Too clayey	0.88		
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
		Flooding	0.40				
3150:							
Grable, occasionally flooded	75	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Flooding	0.60		
3410:							
Haynie, occasionally flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
		Low strength	0.22				
3812:							
Ida, eroded	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
3822:							
Ida, eroded	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
3892:							
Inglewood, rarely flooded	90	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
		Frost action	0.50	Flooding	0.60	Droughty	0.22
				Depth to saturated zone	0.35		
4112:							
Judson	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
4230:							
Kennebec, occasionally flooded	85	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Depth to saturated zone	0.35		
		Low strength	1.00	Cutbanks cave	0.10		
4287:							
Kezan, occasionally flooded	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
4288:							
Kezan, occasionally flooded	35	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Flooding	1.00	Flooding	0.60	Depth to saturated zone	0.03
		Low strength	1.00	Cutbanks cave	0.10		
		Depth to saturated zone	0.03				
		Shrink-swell	0.01				
Kennebec, occasionally flooded	35	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Depth to saturated zone	0.35		
		Low strength	1.00	Cutbanks cave	0.10		
4780:							
Luton, rarely flooded	75	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Too clayey	1.00
		Low strength	1.00	Too clayey	1.00		
		Frost action	0.50				
		Flooding	0.40				
4956:							
Marshall	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
4961:							
Marshall	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
4974:							
Marshall, eroded	55	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
Pohocco, eroded	35	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
5321:							
Monona	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
Ida, eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
5348:							
Monona, eroded	55	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
Pohocco, eroded	35	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
5358:							
Moody	90	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.50				
5415:							
Moville, rarely flooded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Too clayey	0.88		
		Low strength	0.78	Depth to saturated zone	0.35		
		Flooding	0.40	Cutbanks cave	0.10		
5493:							
Napier	40	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
5493:							
Nodaway, occasionally flooded	30	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Depth to saturated zone	0.35		
		Low strength	1.00	Cutbanks cave	0.10		
Gullied land	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
5575:							
Nora, eroded	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
5583:							
Nora, eroded	55	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.96				
Crofton, eroded	35	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.96	Slope	0.96
		Slope	0.96	Cutbanks cave	0.10		
		Frost action	0.50				
5800:							
Omadi, rarely flooded	75	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Depth to saturated zone	0.35		
		Low strength	1.00	Cutbanks cave	0.10		
		Flooding	0.40				
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Very limited	
		Frost action	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Flooding	1.00	Too clayey	0.88	Flooding	0.60
		Low strength	1.00	Flooding	0.60	Depth to saturated zone	0.03
		Depth to saturated zone	0.03	Cutbanks cave	0.10		
5815:							
Onawa, occasionally flooded	75	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Flooding	1.00	Too clayey	0.88	Depth to saturated zone	0.03
		Low strength	1.00	Flooding	0.60		
		Depth to saturated zone	0.03	Cutbanks cave	0.10		

Table 11b.--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
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Frost action	0.50	Cutbanks cave	1.00	Flooding	0.60
		Depth to saturated zone	0.03	Flooding	0.60	Depth to saturated zone	0.03
				Too clayey	0.50	Droughty	0.01
6133:							
Platte, occasionally flooded	55	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Frost action	0.50	Cutbanks cave	1.00	Depth to saturated zone	0.03
		Depth to saturated zone	0.03	Flooding	0.60	Droughty	0.01
6164:							
Pohocco, eroded	57	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.96				
		Shrink-swell	0.01				
Monona, eroded	40	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.96				
		Shrink-swell	0.01				
6178:							
Pohocco, eroded	50	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.96				
		Shrink-swell	0.01				
Ida, eroded	30	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Cutbanks cave	0.10		
		Slope	0.96				
6490:							
Salix, rarely flooded	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Depth to saturated zone	0.35		
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.78				
		Flooding	0.40				
6660:							
Sarpy, occasionally flooded	90	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Droughty	0.64
				Flooding	0.60	Flooding	0.60

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
6670:							
Sarpy, occasionally flooded	75	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Flooding	0.60	Droughty	0.48
6906:							
Shell, occasionally flooded	95	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
8166:							
Zook, occasionally flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
		Low strength	1.00	Too clayey	0.01		
		Shrink-swell	1.00				
8503:							
Monona	85	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
8504:							
Monona	80	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Shrink-swell	0.01				
8505:							
Fontanelle, depressional, frequently flooded	85	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
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.80		
8507:							
Onawet, depressional, frequently flooded	75	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
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.80	Too clayey	1.00
				Too clayey	0.68		

Table 11b.--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
8508:							
Onawa, occasionally flooded------------	50	Very limited		Very limited		Very limited	
		Frost action	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Flooding	1.00	Too clayey	0.88	Flooding	0.60
		Low strength	1.00	Flooding	0.60	Depth to saturated zone	0.03
		Depth to saturated zone	0.03	Cutbanks cave	0.10		
Haynie, occasionally flooded------------	30	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Flooding	0.60	Flooding	0.60
		Flooding	1.00	Cutbanks cave	0.10		
		Low strength	0.22				
8510:							
Wathena, occasionally flooded------------	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Flooding	0.60		
				Depth to saturated zone	0.35		
8511:							
Wathena, rarely flooded------------	80	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
				Depth to saturated zone	0.35		
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	1.00	Cutbanks cave	0.10		
Napier--------------	40	Very limited		Somewhat limited		Not limited	
		Frost action	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9998:							
Water---------------	100	Not rated		Not rated		Not rated	

Table 12a.--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: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
1074:					
Albaton, occasionally flooded	87	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		
1075:					
Albaton, depressional, frequently flooded	70	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Restricted permeability	1.00	Flooding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
1090:					
Alcester	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.18
				Seepage	0.15
1432:					
Belfore	80	Very limited		Not limited	
		Restricted permeability	1.00		
1436:					
Belfore	85	Very limited		Not limited	
		Restricted permeability	1.00		
1594:					
Blyburg, rarely flooded	85	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
1859:					
Burchard, eroded	90	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.04	Seepage	0.01

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
1879:					
Burchard, eroded	50	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00	Seepage	0.01
Steinauer, eroded	45	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	1.00		
2030:					
Cass, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
2041:					
Cass, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
2192:					
Cooper, rarely flooded	90	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		
2320:					
Crofton, eroded	85	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.50	Seepage	0.50
2322:					
Crofton, eroded	85	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.50	Seepage	0.50
2855:					
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
2863:					
Fluvaquents, silty, frequently flooded	100	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00
2890:					
Forney, rarely flooded	85	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Seepage	0.53
		Flooding	0.40	Flooding	0.40
3150:					
Grable, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
3410:					
Haynie, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
				Seepage	1.00
3812:					
Ida, eroded	90	Somewhat limited		Very limited	
		Restricted permeability	0.46	Slope	1.00
				Seepage	0.53
3822:					
Ida, eroded	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
3892:					
Inglewood, rarely flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	0.84	Depth to saturated zone	0.17
4112:					
Judson	80	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.18

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
4230:					
Kennebec, occasionally flooded	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.85	Depth to saturated zone	0.17
		Depth to saturated zone	0.84	Seepage	0.15
4287:					
Kezan, occasionally flooded	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.85	Seepage	0.15
4288:					
Kezan, occasionally flooded	35	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	0.85	Seepage	0.15
Kennebec, occasionally flooded	35	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.85	Depth to saturated zone	0.17
		Depth to saturated zone	0.84	Seepage	0.15
4780:					
Luton, rarely flooded	75	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		
4956:					
Marshall	75	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.01
4961:					
Marshall	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.18
				Seepage	0.01
4974:					
Marshall, eroded	55	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.01

Table 12a.--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
4974:					
Pohocco, eroded-----	35	Somewhat limited		Very limited	
		Restricted permeability	0.85	Slope	1.00
				Seepage	0.50
5321:					
Monona--------------	90	Somewhat limited		Somewhat limited	
		Restricted permeability	0.85	Seepage	0.53
				Slope	0.18
5343:					
Monona, eroded------	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.85	Seepage	0.53
Ida, eroded---------	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
5348:					
Monona, eroded------	55	Somewhat limited		Very limited	
		Restricted permeability	0.85	Slope	1.00
				Seepage	0.53
Pohocco, eroded-----	35	Somewhat limited		Very limited	
		Restricted permeability	0.85	Slope	1.00
				Seepage	0.50
5358:					
Moody---------------	90	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.18
5415:					
Moville, rarely flooded------------	85	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
				Flooding	0.40
		Depth to saturated zone	0.84	Depth to saturated zone	0.17
		Flooding	0.40		
5493:					
Napier--------------	40	Somewhat limited		Very limited	
		Restricted permeability	0.46	Slope	1.00
				Seepage	0.53
Nodaway, occasionally flooded------------	30	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.84	Seepage	0.50
				Depth to saturated zone	0.17
		Restricted permeability	0.50		

Table 12a.--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
5493:					
Gullied land--------	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
5575:					
Nora, eroded--------	85	Somewhat limited		Very limited	
		Restricted permeability	0.46	Slope	1.00
				Seepage	0.53
5583:					
Nora, eroded--------	55	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
Crofton, eroded-----	35	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.50	Seepage	0.50
5800:					
Omadi, rarely flooded------------	75	Somewhat limited		Very limited	
		Depth to saturated zone	0.84	Seepage	1.00
		Restricted permeability	0.50	Flooding	0.40
		Flooding	0.40	Depth to saturated zone	0.17
5814:					
Onawa, occasionally flooded------------	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
5815:					
Onawa, occasionally flooded------------	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
6075:					
Percival, occasionally flooded------------	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
6133:					
Platte, occasionally flooded	55	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
6164:					
Pohocco, eroded	57	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.85	Seepage	0.50
Monona, eroded	40	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.85	Seepage	0.53
6178:					
Pohocco, eroded	50	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.85	Seepage	0.50
Ida, eroded	30	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
6490:					
Salix, rarely flooded	80	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to saturated zone	0.84	Flooding	0.40
		Flooding	0.40	Depth to saturated zone	0.17
6660:					
Sarpy, occasionally flooded	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
6670:					
Sarpy, occasionally flooded	75	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
6906:					
Shell, occasionally flooded	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.85	Seepage	0.15

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
8166:					
Zook, occasionally flooded	80	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		
8503:					
Monona	85	Somewhat limited		Somewhat limited	
		Restricted permeability	0.85	Seepage	0.53
8504:					
Monona	80	Somewhat limited		Somewhat limited	
		Restricted permeability	0.85	Seepage	0.53
				Slope	0.18
8505:					
Fontanelle, depressional, frequently flooded	85	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
		Restricted permeability	1.00	Seepage	1.00
8507:					
Onawet, depressional, frequently flooded	75	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Restricted permeability	1.00	Flooding	1.00
				Seepage	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00		
		Filtering capacity	1.00		
8508:					
Onawa, occasionally flooded	50	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
Haynie, occasionally flooded	30	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
				Seepage	1.00

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
8510:					
Wathena, occasionally flooded	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	0.84	Depth to saturated zone	0.17
8511:					
Wathena, rarely flooded	80	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	0.84	Flooding	0.40
		Flooding	0.40	Depth to saturated zone	0.17
8512:					
Gullied land	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
Napier	40	Somewhat limited		Very limited	
		Restricted permeability	0.46	Slope	1.00
				Seepage	0.53
9900:					
Arents, earthen dams	100	Not rated		Not rated	
9980:					
Mine or Quarry	100	Not rated		Not rated	
9990:					
Aquolls	100	Not rated		Not rated	
9995:					
Miscellaneous water	100	Not rated		Not rated	
9998:					
Water	100	Not rated		Not rated	

Table 12b.--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
1074:							
Albaton, occasionally flooded	87	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	Too clayey	1.00
		Seepage	1.00			Hard to compact	1.00
		Too clayey	1.00				
1075:							
Albaton, depressional, frequently flooded	70	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	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
1090:							
Alcester	90	Not limited		Not limited		Not limited	
1432:							
Belfore	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
1436:							
Belfore	85	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
1594:							
Blyburg, rarely flooded	85	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.13
		Flooding	0.40	Flooding	0.40		
1859:							
Burchard, eroded	90	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, eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Steinauer, eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
2030:							
Cass, occasionally flooded	90	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.52
		Seepage	1.00	Seepage	1.00		
2041:							
Cass, occasionally flooded	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.52
		Seepage	1.00	Seepage	1.00		
2192:							
Cooper, rarely flooded	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
						Hard to compact	1.00
		Too clayey	1.00	Flooding	0.40	Depth to saturated zone	0.86
		Flooding	0.40				
2320:							
Crofton, eroded	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
2322:							
Crofton, eroded	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
2855:							
Fluvaquents, sandy, frequently flooded	100	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		
						Seepage	1.00
		Seepage	1.00	Seepage	1.00	Too sandy	0.50
		Too sandy	1.00				
2863:							
Fluvaquents, silty, frequently flooded	100	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		
						Seepage	0.01
		Seepage	1.00	Seepage	1.00		
2890:							
Forney, rarely 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
		Too clayey	1.00	Flooding	0.40	Too clayey	1.00
		Flooding	0.40			Hard to compact	1.00
3150:							
Grable, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00				

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
3410:							
Haynie, occasionally flooded	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.01
		Seepage	1.00	Seepage	1.00		
3812:							
Ida, eroded	90	Not limited		Not limited		Not limited	
3822:							
Ida, eroded	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
3892:							
Inglewood, rarely flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Seepage	1.00	Seepage	1.00		
4112:							
Judson	80	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
4230:							
Kennebec, occasionally flooded	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		
4287:							
Kezan, occasionally flooded	70	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		
4288:							
Kezan, occasionally flooded	35	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.68
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
Kennebec, occasionally flooded	35	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
4780:							
Luton, rarely flooded	75	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	1.00	Flooding	0.40	Too clayey	1.00
		Flooding	0.40			Hard to compact	1.00

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
4956:							
Marshall	75	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
4961:							
Marshall	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
4974:							
Marshall, eroded	55	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Pohocco, eroded	35	Not limited		Not limited		Not limited	
5321:							
Monona	90	Not limited		Not limited		Not limited	
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Ida, eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5348:							
Monona, eroded	55	Not limited		Not limited		Not limited	
Pohocco, eroded	35	Not limited		Not limited		Not limited	
5358:							
Moody	90	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
5415:							
Moville, rarely flooded	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00	Seepage	1.00	Hard to compact	1.00
		Flooding	0.40	Flooding	0.40		
5493:							
Napier	40	Not limited		Not limited		Not limited	
Nodaway, occasionally flooded	30	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
Gullied land	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
5575:							
Nora, eroded	85	Not limited		Not limited		Not limited	

Table 12b.--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
5583:							
Nora, eroded	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
Crofton, eroded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
5800:							
Omadi, rarely flooded	75	Very limited		Very limited		Not limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Flooding	0.40	Seepage	1.00		
				Flooding	0.40		
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.68
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	0.13
		Seepage	1.00	Seepage	1.00		
5815:							
Onawa, occasionally flooded	75	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.68
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	0.13
		Seepage	1.00	Seepage	1.00		
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00	Depth to saturated zone	0.68
		Too sandy	1.00				
6133:							
Platte, occasionally flooded	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00	Depth to saturated zone	0.68
		Too sandy	1.00				
6164:							
Pohocco, eroded	57	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
Monona, eroded	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
6178:							
Pohocco, eroded	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
Ida, eroded	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96	Slope	0.96
6490:							
Salix, rarely flooded	80	Very limited		Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	0.01
		Seepage	1.00	Seepage	1.00		
		Flooding	0.40	Flooding	0.40		
6660:							
Sarpy, occasionally flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00				
6670:							
Sarpy, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00				
6906:							
Shell, occasionally flooded	95	Very limited		Very limited		Not limited	
		Flooding	1.00	Flooding	1.00		
8166:							
Zook, occasionally flooded	80	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	Too clayey	1.00
		Too clayey	1.00			Hard to compact	1.00
8503:							
Monona	85	Not limited		Not limited		Not limited	
8504:							
Monona	80	Not limited		Not limited		Not limited	
8505:							
Fontanelle, depressional, frequently flooded	85	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		

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
8507:							
Onawet, depressional, frequently flooded	75	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		
8508:							
Onawa, occasionally flooded-----------	50	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.68
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	0.13
		Seepage	1.00	Seepage	1.00		
Haynie, occasionally flooded-----------	30	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.01
		Seepage	1.00	Seepage	1.00		
8510:							
Wathena, occasionally flooded-----------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00		
		Too sandy	1.00				
8511:							
Wathena, rarely flooded-----------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too sandy	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Flooding	0.40		
		Flooding	0.40				
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Napier--------------	40	Not limited		Not limited		Not limited	
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	

Table 12b.--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
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 13a.--Agricultural Waste 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	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1074: Albaton, occasionally flooded	87	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
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
1075: Albaton, depressional, frequently flooded	70	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Runoff	0.40				
1090: Alcester	90	Not limited		Not limited		Somewhat limited	
						Too steep for surface application	0.02
1432: Belfore	80	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Too acid	0.11	Too acid	0.42	Too acid	0.42
1436: Belfore	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Too acid	0.11	Too acid	0.42	Too acid	0.42
1594: Blyburg, rarely flooded	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Flooding	0.40	Restricted permeability	0.31
				Restricted permeability	0.31		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
1859:							
Burchard, eroded	90	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	1.00
		Slope	0.04	Slope	0.04	Too steep for sprinkler application	0.22
		Too acid	0.01	Too acid	0.03	Restricted permeability	0.22
						Too acid	0.03
1879:							
Burchard, eroded	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for sprinkler application	1.00
		Too acid	0.01	Too acid	0.03	Restricted permeability	0.22
						Too acid	0.03
Steinauer, eroded	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for sprinkler application	1.00
						Restricted permeability	0.22
2030:							
Cass, occasionally flooded	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
2041:							
Cass, occasionally flooded	80	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
2192:							
Cooper, rarely flooded	90	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
				Flooding	0.40		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
2320:							
Crofton, eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
						Too steep for sprinkler application	0.98
2322:							
Crofton, eroded	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
2855:							
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Runoff	0.40				
2863:							
Fluvaquents, silty, frequently flooded	100	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	1.00	Flooding	1.00	Flooding	1.00
		Runoff	0.40				
2890:							
Forney, rarely flooded	85	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
		Runoff	0.40	Flooding	0.40		
3150:							
Grable, occasionally flooded	75	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Depth to dense layer	1.00	Flooding	1.00	Flooding	0.60
		Flooding	0.60				
3410:							
Haynie, occasionally flooded	80	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
3812:							
Ida, eroded---------	90	Not limited		Not limited		Very limited	
						Too steep for surface application	1.00
						Too steep for sprinkler application	0.10
3822:							
Ida, eroded---------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
3892:							
Inglewood, rarely flooded------------	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Leaching	0.45	Droughty	0.01	Droughty	0.01
		Droughty	0.01				
4112:							
Judson--------------	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.30	Restricted permeability	0.30
		Too acid	0.01	Too acid	0.03	Too acid	0.03
						Too steep for surface application	0.02
4230:							
Kennebec, occasionally flooded------------	85	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Too acid	0.01	Too acid	0.03	Too acid	0.03
4287:							
Kezan, occasionally flooded------------	70	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Leaching	0.70	Flooding	1.00	Flooding	0.60
		Flooding	0.60				
4288:							
Kezan, occasionally flooded------------	35	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.95	Flooding	1.00	Depth to saturated zone	0.95
		Leaching	0.70	Depth to saturated zone	0.95	Flooding	0.60
		Flooding	0.60				

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
4288:							
Kennebec, occasionally flooded	35	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Too acid	0.01	Too acid	0.03	Too acid	0.03
4780:							
Luton, rarely flooded	75	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
		Runoff	0.40	Flooding	0.40		
4956:							
Marshall	75	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Restricted permeability	0.31	Restricted permeability	0.31
4961:							
Marshall	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Too acid	0.42	Too acid	0.42
		Too acid	0.11	Restricted permeability	0.31	Restricted permeability	0.31
						Too steep for surface application	0.02
4974:							
Marshall, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Too acid	0.42	Too steep for surface application	1.00
		Too acid	0.11	Restricted permeability	0.31	Too acid	0.42
						Restricted permeability	0.31
						Too steep for sprinkler application	0.10
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for surface application	1.00
						Restricted permeability	0.31
						Too steep for sprinkler application	0.10
5321:							
Monona	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.01	Too acid	0.03	Too acid	0.03
						Too steep for surface application	0.02

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Too acid	0.01	Too acid	0.03	Too steep for sprinkler application	1.00
						Too acid	0.03
Ida, eroded	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
5348:							
Monona, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Too acid	0.01	Too acid	0.03	Too steep for surface application	1.00
						Too steep for sprinkler application	0.10
						Too acid	0.03
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for surface application	1.00
						Restricted permeability	0.31
						Too steep for sprinkler application	0.10
5358:							
Moody	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
		Too acid	0.01	Too acid	0.03	Too acid	0.03
						Too steep for surface application	0.02
5415:							
Moville, rarely flooded	85	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Filtering capacity	0.01	Flooding	0.40	Filtering capacity	0.01
				Filtering capacity	0.01		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
5493:							
Napier	40	Not limited		Not limited		Very limited	
						Too steep for surface application	1.00
						Too steep for sprinkler application	0.10
Nodaway, occasionally flooded	30	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
Gullied land	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
5575:							
Nora, eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for surface application	1.00
		Too acid	0.01	Too acid	0.03	Restricted permeability	0.31
						Too steep for sprinkler application	0.10
						Too acid	0.03
5583:							
Nora, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for sprinkler application	0.98
		Too acid	0.01	Too acid permeability	0.03	Restricted permeability	0.31
						Too acid	0.03
Crofton, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
						Too steep for sprinkler application	0.98
5800:							
Omadi, rarely flooded	75	Not limited		Somewhat limited		Not limited	
				Flooding	0.40		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Flooding	1.00	Depth to saturated zone	0.95
		Flooding	0.60	Depth to saturated zone	0.95	Flooding	0.60
		Runoff	0.40	Filtering capacity	0.01	Filtering capacity	0.01
		Filtering capacity	0.01				
5815:							
Onawa, occasionally flooded	75	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Flooding	1.00	Depth to saturated zone	0.95
		Flooding	0.60	Depth to saturated zone	0.95	Flooding	0.60
		Runoff	0.40	Filtering capacity	0.01	Filtering capacity	0.01
		Filtering capacity	0.01				
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Flooding	1.00	Depth to saturated zone	0.95
		Flooding	0.60	Depth to saturated zone	0.95	Flooding	0.60
		Runoff	0.40	Droughty	0.06	Droughty	0.06
6133:							
Platte, occasionally flooded	55	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Depth to dense layer	1.00	Flooding	1.00	Depth to saturated zone	0.95
		Depth to saturated zone	0.95	Depth to saturated zone	0.95	Flooding	0.60
		Flooding	0.60	Droughty	0.18	Droughty	0.18
		Droughty	0.18				
6164:							
Pohocco, eroded	57	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for sprinkler application	0.98
						Restricted permeability	0.31

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
6164:							
Monona, eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
		Too acid	0.01	Too acid	0.03	Too steep for sprinkler application	0.98
						Too acid	0.03
6178:							
Pohocco, eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
		Restricted permeability	0.41	Restricted permeability	0.31	Too steep for sprinkler application	0.98
						Restricted permeability	0.31
Ida, eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.96	Slope	0.96	Too steep for surface application	1.00
						Too steep for sprinkler application	0.98
6490:							
Salix, rarely flooded	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Flooding	0.40	Restricted permeability	0.31
				Restricted permeability	0.31		
6660:							
Sarpy, occasionally flooded	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Droughty	0.62	Flooding	1.00	Droughty	0.62
		Flooding	0.60	Droughty	0.62	Flooding	0.60
		Leaching	0.45				
6670:							
Sarpy, occasionally flooded	75	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Flooding	1.00	Filtering capacity	1.00
		Flooding	0.60	Filtering capacity	1.00	Flooding	0.60
		Droughty	0.50	Droughty	0.50	Droughty	0.50
		Leaching	0.45				
6906:							
Shell, occasionally flooded	95	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Too acid	0.01	Too acid	0.03	Too acid	0.03

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
8166:							
Zook, occasionally flooded	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Flooding	1.00	Restricted permeability	1.00
		Flooding	0.60	Restricted permeability	1.00	Flooding	0.60
		Leaching	0.50	Too acid	0.14	Too acid	0.14
		Too acid	0.03				
8503:							
Monona	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.01	Too acid	0.03	Too acid	0.03
8504:							
Monona	80	Somewhat limited		Somewhat limited		Somewhat limited	
		Too acid	0.01	Too acid	0.03	Too acid	0.03
						Too steep for surface application	0.02
8505:							
Fontanelle, depressional, frequently flooded	85	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	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Restricted permeability	0.96	Restricted permeability	0.96
		Runoff	0.40				
8507:							
Onawet, depressional, frequently flooded	75	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Runoff	0.40	Filtering capacity	0.13	Filtering capacity	0.13
8508:							
Onawa, occasionally flooded	50	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Flooding	1.00	Depth to saturated zone	0.95
		Flooding	0.60	Depth to saturated zone	0.95	Flooding	0.60
		Runoff	0.40	Filtering capacity	0.01	Filtering capacity	0.01
		Filtering capacity	0.01				

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste: Rating class and limiting features	Value	Application of sewage sludge: Rating class and limiting features	Value	Disposal of wastewater by irrigation: Rating class and limiting features	Value
8508:							
Haynie, occasionally flooded	30	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
8510:							
Wathena, occasionally flooded	80	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Flooding	1.00	Filtering capacity	1.00
		Flooding	0.60	Filtering capacity	1.00	Flooding	0.60
8511:							
Wathena, rarely flooded	80	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
				Flooding	0.40		
8512:							
Gullied land	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
Napier	40	Not limited		Not limited		Very limited	
						Too steep for surface application	1.00
						Too steep for sprinkler application	0.10
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry	100	Not rated		Not rated		Not rated	
9990:							
Aquolls	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 13b.--Agricultural Waste 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	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
1074:							
Albaton, occasionally flooded	87	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
				Flooding	0.60	Flooding	0.60
1075:							
Albaton, depressional, frequently flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Ponding	1.00	Restricted permeability	1.00
		Ponding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Too level	0.50	Depth to saturated zone	1.00	Flooding	1.00
1090:							
Alcester	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	0.02
1432:							
Belfore	80	Somewhat limited		Very limited		Very limited	
		Seepage	0.67	Restricted permeability	1.00	Restricted permeability	1.00
		Too acid	0.42			Too acid	0.42
1436:							
Belfore	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.67	Restricted permeability	1.00	Restricted permeability	1.00
		Too acid	0.42			Too acid	0.42
1594:							
Blyburg, rarely flooded	85	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.69	Restricted permeability	1.00	Restricted permeability	0.21
		Flooding	0.40				

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
1859:							
Burchard, eroded----	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.50	Slope	1.00	Too steep for sprinkler application	0.50
		Too acid	0.03			Restricted permeability	0.15
						Too acid	0.03
1879:							
Burchard, eroded----	50	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
		Too acid	0.03			Restricted permeability	0.15
						Too acid	0.03
Steinauer, eroded---	45	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.77	Restricted permeability	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.15
2030:							
Cass, occasionally flooded-----------	90	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Filtering capacity	1.00
		Seepage	1.00	Restricted permeability	0.31	Flooding	0.60
2041:							
Cass, occasionally flooded-----------	80	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Restricted permeability	0.72	Filtering capacity	1.00
		Seepage	1.00	Flooding	0.60	Flooding	0.60
2192:							
Cooper, rarely flooded-----------	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Seepage	0.69	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	0.40				

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
2320:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
2322:							
Crofton, eroded-----	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
2855:							
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Filtering capacity	1.00
		Seepage	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Flooding	1.00
		Too level	0.50				
2863:							
Fluvaquents, silty, frequently flooded	100	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	Flooding	1.00
		Seepage	1.00	Restricted permeability	1.00		
		Too level	0.50				
2890:							
Forney, rarely flooded-----------	85	Very limited		Very limited		Very limited	
		Seepage	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
		Flooding	0.40				
3150:							
Grable, occasionally flooded-----------	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Seepage	1.00	Flooding	0.60	Flooding	0.60
3410:							
Haynie, occasionally flooded-----------	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.99	Flooding	0.60
		Seepage	1.00	Flooding	0.60	Filtering capacity	0.01

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
3812:							
Ida, eroded	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
3822:							
Ida, eroded	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
3892:							
Inglewood, rarely flooded	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Filtering capacity	1.00
		Seepage	1.00	Flooding	0.60	Flooding	0.60
4112:							
Judson	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.69	Restricted permeability	1.00	Restricted permeability	0.21
		Too acid	0.03			Too acid	0.03
						Too steep for surface application	0.02
4230:							
Kennebec, occasionally flooded	85	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Flooding	0.60
		Seepage	1.00	Depth to saturated zone	1.00	Too acid	0.03
		Too acid	0.03	Flooding	0.60		
4287:							
Kezan, occasionally flooded	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Seepage	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Depth to saturated zone	1.00	Flooding	0.60		

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4288:							
Kezan, occasionally flooded	35	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	0.95
		Seepage	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Depth to saturated zone	0.95	Flooding	0.60		
Kennebec, occasionally flooded	35	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Flooding	0.60
		Seepage	1.00	Depth to saturated zone	1.00	Too acid	0.03
		Too acid	0.03	Flooding	0.60		
4780:							
Luton, rarely flooded	75	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Flooding	0.40	Depth to saturated zone	1.00	Restricted permeability	1.00
4956:							
Marshall	75	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.69	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Restricted permeability	0.21
4961:							
Marshall	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.69	Restricted permeability	1.00	Too acid	0.42
		Too acid	0.42			Restricted permeability	0.21
						Too steep for surface application	0.02
4974:							
Marshall, eroded	55	Somewhat limited		Very limited		Very limited	
		Seepage	0.69	Restricted permeability	1.00	Too steep for surface application	1.00
		Too acid	0.42	Slope	1.00	Too acid	0.42
		Too steep for surface application	0.22			Too steep for sprinkler application	0.22
						Restricted permeability	0.21

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
4974:							
Pohocco, eroded	35	Somewhat limited		Very limited		Very limited	
		Seepage	0.69	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
						Restricted permeability	0.21
5321:							
Monona	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.03
		Too acid	0.03			Too steep for surface application	0.02
5343:							
Monona, eroded	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
		Too acid	0.03			Too acid	0.03
Ida, eroded	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
5348:							
Monona, eroded	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
		Too acid	0.03			Too acid	0.03
Pohocco, eroded	35	Somewhat limited		Very limited		Very limited	
		Seepage	0.69	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
						Restricted permeability	0.21

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5358:							
Moody	90	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.77	Restricted permeability	1.00	Restricted permeability	0.15
		Too acid	0.03			Too acid	0.03
						Too steep for surface application	0.02
5415:							
Moville, rarely flooded	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Flooding	0.40	Depth to saturated zone	1.00	Filtering capacity	0.01
5493:							
Napier	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
Nodaway, occasionally flooded	30	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	0.60
		Seepage	1.00	Restricted permeability	1.00		
				Flooding	0.60		
Gullied land	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
5575:							
Nora, eroded	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.69	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
		Too acid	0.03			Restricted permeability	0.21
						Too acid	0.03

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5583:							
Nora, eroded	55	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.69	Restricted permeability	1.00	Too steep for sprinkler application	1.00
		Too acid	0.03			Restricted permeability	0.21
						Too acid	0.03
Crofton, eroded	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
5800:							
Omadi, rarely flooded	75	Very limited		Very limited		Not limited	
		Seepage	1.00	Depth to saturated zone	1.00		
		Flooding	0.40	Restricted permeability	1.00		
5814:							
Onawa, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	1.00	Depth to saturated zone	0.95
				Flooding	0.60	Flooding	0.60
						Filtering capacity	0.01
5815:							
Onawa, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	1.00	Depth to saturated zone	0.95
				Flooding	0.60	Flooding	0.60
						Filtering capacity	0.01
6075:							
Percival, occasionally flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	1.00	Restricted permeability	1.00
				Flooding	0.60	Depth to saturated zone	0.95
						Flooding	0.60

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6133:							
Platte, occasionally flooded	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Filtering capacity	1.00
		Seepage	1.00	Restricted permeability	0.72	Depth to saturated zone	0.95
		Depth to saturated zone	0.95	Flooding	0.60	Flooding	0.60
6164:							
Pohocco, eroded	57	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.69	Restricted permeability	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.21
Monona, eroded	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
		Too acid	0.03			Too acid	0.03
6178:							
Pohocco, eroded	50	Very limited		Very limited		Very limited	
		Too steep for surface application	1.00	Slope	1.00	Too steep for surface application	1.00
		Seepage	0.69	Restricted permeability	1.00	Too steep for sprinkler application	1.00
						Restricted permeability	0.21
Ida, eroded	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
6490:							
Salix, rarely flooded	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.69	Restricted permeability	1.00	Restricted permeability	0.21
		Flooding	0.40	Depth to saturated zone	1.00		

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
6660:							
Sarpy, occasionally flooded	90	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Filtering capacity	1.00
		Seepage	1.00			Flooding	0.60
6670:							
Sarpy, occasionally flooded	75	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Filtering capacity	1.00
		Seepage	1.00			Flooding	0.60
6906:							
Shell, occasionally flooded	95	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	1.00	Flooding	0.60
		Seepage	1.00	Flooding	0.60	Too acid	0.03
		Too acid	0.03				
8166:							
Zook, occasionally flooded	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Restricted permeability	1.00
		Too acid	0.14	Flooding	0.60	Flooding	0.60
						Too acid	0.14
8503:							
Monona	85	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.03
		Too acid	0.03				
8504:							
Monona	80	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Too acid	0.03
		Too acid	0.03			Too steep for surface application	0.02
8505:							
Fontanelle, depressional, frequently flooded	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Flooding	1.00
		Too level	0.50	Depth to saturated zone	1.00	Restricted permeability	0.83
		Seepage	0.04				

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
8507:							
Onawet, depressional, frequently flooded	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Restricted permeability	1.00	Flooding	1.00
		Too level	0.50	Depth to saturated zone	1.00	Restricted permeability	1.00
						Filtering capacity	0.13
8508:							
Onawa, occasionally flooded------------	50	Very limited		Very limited		Very limited	
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Depth to saturated zone	0.95	Depth to saturated zone	1.00	Depth to saturated zone	0.95
				Flooding	0.60	Flooding	0.60
						Filtering capacity	0.01
Haynie, occasionally flooded------------	30	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Restricted permeability	0.99	Flooding	0.60
		Seepage	1.00	Flooding	0.60	Filtering capacity	0.01
8510:							
Wathena, occasionally flooded------------	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Depth to saturated zone	1.00	Filtering capacity	1.00
		Seepage	1.00	Restricted permeability	0.96	Flooding	0.60
				Flooding	0.60		
8511:							
Wathena, rarely flooded------------	80	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Filtering capacity	1.00
		Flooding	0.40	Restricted permeability	0.96		
8512:							
Gullied land--------	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater: Rating class and limiting features	Value	Rapid infiltration of wastewater: Rating class and limiting features	Value	Slow rate treatment of wastewater: Rating class and limiting features	Value
8512:							
Napier--------------	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for sprinkler application	0.22
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry------	100	Not rated		Not rated		Not rated	
9990:							
Aquolls-------------	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	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 ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. 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	Value	Rating class	Value
1074:					
Albaton, occasionally flooded	87	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1075:					
Albaton, depressional, frequently flooded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1090:					
Alcester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1432:					
Belfore	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1436:					
Belfore	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1594:					
Blyburg, rarely flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1859:					
Burchard, eroded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1879:					
Burchard, eroded	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Steinauer, eroded	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	Value	Rating class	Value
2030:					
Cass, occasionally flooded	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
2041:					
Cass, occasionally flooded	80	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
2192:					
Cooper, rarely flooded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2320:					
Crofton, eroded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2322:					
Crofton, eroded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2855:					
Fluvaquents, sandy, frequently flooded	100	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.10
		Thickest layer	0.00	Bottom layer	0.64
2863:					
Fluvaquents, silty, frequently flooded	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2890:					
Forney, rarely flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3150:					
Grable, occasionally flooded	75	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.13
3410:					
Haynie, occasionally flooded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3812:					
Ida, eroded	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	Value	Rating class	Value
3822:					
Ida, eroded	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
3892:					
Inglewood, rarely flooded	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.08
		Thickest layer	0.00	Bottom layer	0.86
4112:					
Judson	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4230:					
Kennebec, occasionally flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4287:					
Kezan, occasionally flooded	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4288:					
Kezan, occasionally flooded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Kennebec, occasionally flooded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4780:					
Luton, rarely flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4956:					
Marshall	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4961:					
Marshall	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: Rating class	Value	Potential source of sand: Rating class	Value
4974:					
Marshall, eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Pohocco, eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5321:					
Monona	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5343:					
Monona, eroded	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ida, eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5348:					
Monona, eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Pohocco, eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5358:					
Moody	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5415:					
Moville, rarely flooded	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5493:					
Napier	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Nodaway, occasionally flooded	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Gullied land	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5575:					
Nora, eroded	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: Rating class	Value	Potential source of sand: Rating class	Value
5583:					
Nora, eroded	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Crofton, eroded	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5800:					
Omadi, rarely flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5814:					
Onawa, occasionally flooded	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5815:					
Onawa, occasionally flooded	75	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6075:					
Percival, occasionally flooded	75	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
6133:					
Platte, occasionally flooded	55	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
6164:					
Pohocco, eroded	57	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Monona, eroded	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6178:					
Pohocco, eroded	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Ida, eroded	30	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	Value	Rating class	Value
6490:					
Salix, rarely flooded------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6660:					
Sarpy, occasionally flooded------------	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.30
		Thickest layer	0.00	Thickest layer	0.30
6670:					
Sarpy, occasionally flooded------------	75	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.03
		Thickest layer	0.00	Bottom layer	0.30
6906:					
Shell, occasionally flooded------------	95	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8166:					
Zook, occasionally flooded------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8503:					
Monona--------------	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8504:					
Monona--------------	80	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8505:					
Fontanelle, depressional, frequently flooded	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.01
8507:					
Onawet, depressional, frequently flooded	75	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
8508:					
Onawa, occasionally flooded------------	50	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	Value	Rating class	Value
8508:					
Haynie, occasionally flooded------------	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
8510:					
Wathena, occasionally flooded------------	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.25
8511:					
Wathena, rarely flooded------------	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.25
8512:					
Gullied land--------	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Napier--------------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9900:					
Arents, earthen dams	100	Not rated		Not rated	
9980:					
Mine or Quarry------	100	Not rated		Not rated	
9990:					
Aquolls-------------	100	Not rated		Not rated	
9995:					
Miscellaneous water	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 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: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
1074:							
Albaton, occasionally flooded	87	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
		Low content of organic matter	0.50	Low strength	0.00	Depth to saturated zone	0.00
		Carbonate content	0.97	Shrink-swell	0.00	Carbonate content	0.97
1075:							
Albaton, depressional, frequently flooded	70	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
		Low content of organic matter	0.50	Shrink-swell	0.00	Depth to saturated zone	0.00
		Carbonate content	0.97	Low strength	0.00	Carbonate content	0.97
1090:							
Alcester	90	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
1432:							
Belfore	80	Fair		Poor		Fair	
		Too clayey	0.82	Low strength	0.00	Too clayey	0.82
		Too acid	0.84	Shrink-swell	0.73		
		Low content of organic matter	0.88				
		Water erosion	0.90				
1436:							
Belfore	85	Fair		Poor		Fair	
		Too clayey	0.82	Low strength	0.00	Too clayey	0.82
		Too acid	0.84	Shrink-swell	0.73		
		Low content of organic matter	0.88				
		Water erosion	0.90				
1594:							
Blyburg, rarely flooded	85	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
1859:							
Burchard, eroded	90	Fair		Poor		Fair	
		Low content of organic matter	0.88	Low strength	0.00	Too clayey	0.66
		Too clayey	0.92	Shrink-swell	0.93	Slope	0.96
		Too acid	0.99				
		Water erosion	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
1879:							
Burchard, eroded----	50	Fair		Poor		Poor	
		Low content of organic matter	0.88	Low strength	0.00	Slope	0.00
		Too clayey	0.92	Shrink-swell	0.93	Too clayey	0.66
		Too acid	0.99				
		Water erosion	0.99				
Steinauer, eroded---	45	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.99	Shrink-swell	0.92		
2030:							
Cass, occasionally flooded-----------	90	Fair		Good		Good	
		Low content of organic matter	0.88				
2041:							
Cass, occasionally flooded-----------	80	Fair		Good		Good	
		Low content of organic matter	0.88				
2192:							
Cooper, rarely flooded-----------	90	Fair		Poor		Fair	
		Too clayey	0.99	Low strength	0.00	Depth to saturated zone	0.53
				Shrink-swell	0.02	Too clayey	0.99
				Depth to saturated zone	0.53		
2320:							
Crofton, eroded-----	85	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
2322:							
Crofton, eroded-----	85	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.05		
2855:							
Fluvaquents, sandy, frequently flooded	100	Fair		Poor		Poor	
		Too sandy	0.14	Depth to saturated zone	0.00	Depth to saturated zone	0.00
						Too sandy	0.14
2863:							
Fluvaquents, silty, frequently flooded	100	Good		Poor		Poor	
				Depth to saturated zone	0.00	Depth to saturated zone	0.00
				Low strength	0.00		

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
2890:							
Forney, rarely flooded	85	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
		Water erosion	0.90	Low strength	0.00	Depth to saturated zone	0.00
				Shrink-swell	0.00		
3150:							
Grable, occasionally flooded	75	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
3410:							
Haynie, occasionally flooded	80	Fair		Fair		Fair	
		Low content of organic matter	0.50	Low strength	0.78	Carbonate content	0.97
		Water erosion	0.90				
		Carbonate content	0.97				
3812:							
Ida, eroded	90	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Carbonate content	0.97
		Water erosion	0.90				
		Carbonate content	0.97				
3822:							
Ida, eroded	90	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
				Slope	0.05	Carbonate content	0.97
		Water erosion	0.90				
		Carbonate content	0.97				
3892:							
Inglewood, rarely flooded	90	Poor		Good		Good	
		Wind erosion	0.00				
		Low content of organic matter	0.12				
		Droughty	0.99				
4112:							
Judson	80	Fair		Poor		Good	
		Too acid	0.84	Low strength	0.00		
		Water erosion	0.90	Shrink-swell	0.87		
4230:							
Kennebec, occasionally flooded	85	Fair		Poor		Good	
		Too acid	0.99	Low strength	0.00		

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
4287:							
Kezan, occasionally flooded	70	Fair		Poor		Poor	
		Water erosion	0.90	Depth to saturated zone	0.00	Depth to saturated zone	0.00
				Low strength	0.00		
4288:							
Kezan, occasionally flooded	35	Fair		Poor		Fair	
		Water erosion	0.90	Low strength	0.00	Depth to saturated zone	0.76
				Depth to saturated zone	0.76		
Kennebec, occasionally flooded	35	Fair		Poor		Good	
		Too acid	0.99	Low strength	0.00		
4780:							
Luton, rarely flooded	75	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
				Low strength	0.00	Depth to saturated zone	0.00
				Shrink-swell	0.00		
4956:							
Marshall	75	Fair		Poor		Good	
		Too acid	0.84	Low strength	0.00		
		Low content of organic matter	0.88	Shrink-swell	0.91		
		Water erosion	0.90				
4961:							
Marshall	90	Fair		Poor		Good	
		Too acid	0.84	Low strength	0.00		
		Low content of organic matter	0.88	Shrink-swell	0.91		
		Water erosion	0.90				
4974:							
Marshall, eroded	55	Fair		Poor		Good	
		Too acid	0.84	Low strength	0.00		
		Low content of organic matter	0.88	Shrink-swell	0.91		
		Water erosion	0.90				
Pohocco, eroded	35	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.90				
5321:							
Monona	90	Fair		Poor		Good	
		Low content of organic matter	0.18	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
5343:							
Monona, eroded	60	Fair		Poor		Poor	
		Low content of organic matter	0.18	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.05		
		Too acid	0.99				
Ida, eroded	40	Fair		Poor		Poor	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.00
		Water erosion	0.90	Slope	0.05	Carbonate content	0.97
		Carbonate content	0.97				
5348:							
Monona, eroded	55	Fair		Poor		Good	
		Low content of organic matter	0.18	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				
Pohocco, eroded	35	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.90				
5358:							
Moody	90	Fair		Poor		Fair	
		Low content of organic matter	0.88	Low strength	0.00	Too clayey	0.70
		Water erosion	0.90	Shrink-swell	0.87		
		Too clayey	0.98				
		Too acid	0.99				
5415:							
Moville, rarely flooded	85	Fair		Poor		Good	
		Low content of organic matter	0.88	Low strength	0.00		
		Water erosion	0.99	Shrink-swell	0.02		
5493:							
Napier	40	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
Nodaway, occasionally flooded	30	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.90				
Gullied land	30	Fair		Not rated		Poor	
		Low content of organic matter	0.12	Slope	0.00	Slope	0.00
		Water erosion	0.90				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
5575:							
Nora, eroded--------	85	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				
5583:							
Nora, eroded--------	55	Fair		Poor		Fair	
		Low content of organic matter	0.50	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
		Too acid	0.99				
Crofton, eroded-----	35	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
5800:							
Omadi, rarely flooded------------	75	Fair		Poor		Good	
		Low content of organic matter	0.88	Low strength	0.00		
		Water erosion	0.90				
5814:							
Onawa, occasionally flooded------------	80	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Depth to saturated zone	0.76
		Water erosion	0.90	Depth to saturated zone	0.76	Carbonate content	0.97
		Carbonate content	0.97	Shrink-swell	0.93		
5815:							
Onawa, occasionally flooded------------	75	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Depth to saturated zone	0.76
		Water erosion	0.90	Depth to saturated zone	0.76	Carbonate content	0.97
		Carbonate content	0.97	Shrink-swell	0.93		
6075:							
Percival, occasionally flooded------------	75	Poor		Fair		Poor	
		Too clayey	0.00	Depth to saturated zone	0.76	Too clayey	0.00
		Low content of organic matter	0.12	Shrink-swell	0.95	Depth to saturated zone	0.76
		Droughty	0.94				
6133:							
Platte, occasionally flooded------------	55	Poor		Fair		Poor	
		Too sandy	0.00	Depth to saturated zone	0.76	Hard to reclaim	0.00
		Low content of organic matter	0.12			Too sandy	0.00
		Droughty	0.82			Rock fragments	0.03
						Depth to saturated zone	0.76

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
6164:							
Pohocco, eroded-----	57	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
Monona, eroded------	40	Fair		Poor		Fair	
		Low content of organic matter	0.18	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
		Too acid	0.99				
6178:							
Pohocco, eroded-----	50	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
		Water erosion	0.90				
Ida, eroded---------	30	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Slope	0.04
						Carbonate content	0.97
		Water erosion	0.90				
		Carbonate content	0.97				
6490:							
Salix, rarely flooded------------	80	Fair		Poor		Good	
		Low content of organic matter	0.50	Low strength	0.00		
		Water erosion	0.90				
6660:							
Sarpy, occasionally flooded------------	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.12				
		Droughty	0.38				
6670:							
Sarpy, occasionally flooded------------	75	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.12				
		Droughty	0.50				
6906:							
Shell, occasionally flooded------------	95	Fair		Poor		Good	
		Low content of organic matter	0.12	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
8166:							
Zook, occasionally flooded	80	Fair		Poor		Poor	
		Too clayey	0.12	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Too acid	0.95	Low strength	0.00	Too clayey	0.12
		Water erosion	0.99	Shrink-swell	0.14		
8503:							
Monona	85	Fair		Poor		Good	
		Low content of organic matter	0.18	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				
8504:							
Monona	80	Fair		Poor		Good	
		Low content of organic matter	0.18	Low strength	0.00		
		Water erosion	0.90				
		Too acid	0.99				
8505:							
Fontanelle, depressional, frequently flooded	85	Fair		Poor		Poor	
		Low content of organic matter	0.88	Depth to saturated zone	0.00	Depth to saturated zone	0.00
		Water erosion	0.90	Low strength	0.00		
8507:							
Onawet, depressional, frequently flooded	75	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
		Water erosion	0.90	Shrink-swell	0.95	Depth to saturated zone	0.00
8508:							
Onawa, occasionally flooded	50	Fair		Poor		Fair	
		Low content of organic matter	0.12	Low strength	0.00	Depth to saturated zone	0.76
		Water erosion	0.90	Depth to saturated zone	0.76	Carbonate content	0.97
		Carbonate content	0.97	Shrink-swell	0.93		
Haynie, occasionally flooded	30	Fair		Fair		Fair	
		Low content of organic matter	0.50	Low strength	0.78	Carbonate content	0.97
		Water erosion	0.90				
		Carbonate content	0.97				
8510:							
Wathena, occasionally flooded	80	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.99				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value
8511:							
Wathena, rarely flooded	80	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.99				
8512:							
Gullied land	50	Fair		Not rated		Poor	
		Low content of organic matter	0.12	Slope	0.00	Slope	0.00
		Water erosion	0.90				
Napier	40	Fair		Poor		Good	
		Water erosion	0.90	Low strength	0.00		
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry	100	Not rated		Not rated		Not rated	
9990:							
Aquolls	100	Not rated		Not rated		Not rated	
9995:							
Miscellaneous water	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
1074:							
Albaton, occasionally flooded	87	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	0.76		
1075:							
Albaton, depressional, frequently flooded	70	Not limited		Very limited		Very limited	
				Ponding	1.00	Slow refill	1.00
				Depth to saturated zone	1.00	Cutbanks cave	0.10
				Hard to pack	1.00		
1090:							
Alcester	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.38	Piping	0.13	Depth to water	1.00
1432:							
Belfore	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
1436:							
Belfore	85	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
1594:							
Blyburg, rarely flooded	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.91	Depth to water	1.00
1859:							
Burchard, eroded	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.12			Depth to water	1.00
1879:							
Burchard, eroded	50	Somewhat limited		Not limited		Very limited	
		Seepage	0.12			Depth to water	1.00
		Slope	0.03				
Steinauer, eroded	45	Somewhat limited		Not limited		Very limited	
		Seepage	0.05			Depth to water	1.00
		Slope	0.03				
2030:							
Cass, occasionally flooded	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.05	Depth to water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
2041:							
Cass, occasionally flooded-----------	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.05	Depth to water	1.00
2192:							
Cooper, rarely flooded-----------	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.50	Depth to water	0.01
2320:							
Crofton, eroded-----	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.63	Depth to water	1.00
		Slope	0.02				
2322:							
Crofton, eroded-----	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.63	Depth to water	1.00
		Slope	0.23				
2855:							
Fluvaquents, sandy, frequently flooded	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Seepage	0.64		
2863:							
Fluvaquents, silty, frequently flooded	100	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	0.10
				Piping	0.97		
2890:							
Forney, rarely flooded-----------	85	Not limited		Very limited		Somewhat limited	
				Depth to saturated zone	1.00	Slow refill	0.28
						Cutbanks cave	0.10
				Hard to pack	0.84		
3150:							
Grable, occasionally flooded-----------	75	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.13	Depth to water	1.00
3410:							
Haynie, occasionally flooded-----------	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.97	Depth to water	1.00
3812:							
Ida, eroded---------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
3822:							
Ida, eroded---------	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
		Slope	0.23				

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
3892:							
Inglewood, rarely flooded	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.86	Cutbanks cave	1.00
						Depth to water	0.96
4112:							
Judson	80	Somewhat limited		Not limited		Very limited	
		Seepage	0.04			Depth to water	1.00
4230:							
Kennebec, occasionally flooded	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.38	Piping	0.23	Depth to water	0.96
						Slow refill	0.62
						Cutbanks cave	0.10
4287:							
Kezan, occasionally flooded	70	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.38	Depth to saturated zone	1.00	Slow refill	0.62
						Cutbanks cave	0.10
				Piping	0.10		
4288:							
Kezan, occasionally flooded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.38	Depth to saturated zone	0.95	Slow refill	0.62
						Cutbanks cave	0.10
				Piping	0.10	Depth to water	0.02
Kennebec, occasionally flooded	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.38	Piping	0.23	Depth to water	0.96
						Slow refill	0.62
						Cutbanks cave	0.10
4780:							
Luton, rarely flooded	75	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	1.00		
4956:							
Marshall	75	Somewhat limited		Not limited		Very limited	
		Seepage	0.12			Depth to water	1.00
4961:							
Marshall	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.12			Depth to water	1.00
4974:							
Marshall, eroded	55	Somewhat limited		Not limited		Very limited	
		Seepage	0.12			Depth to water	1.00
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.19	Depth 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
5321:							
Monona	90	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
5343:							
Monona, eroded	60	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
		Slope	0.23				
Ida, eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
		Slope	0.23				
5348:							
Monona, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
Pohocco, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.19	Depth to water	1.00
5358:							
Moody	90	Somewhat limited		Not limited		Very limited	
		Seepage	0.72			Depth to water	1.00
5415:							
Moville, rarely flooded	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Hard to pack	0.20	Slow refill	1.00
						Depth to water	0.96
						Cutbanks cave	0.10
5493:							
Napier	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.32	Depth to water	1.00
Nodaway, occasionally flooded	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.32	Depth to water	0.96
						Slow refill	0.30
						Cutbanks cave	0.10
Gullied land	30	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
5575:							
Nora, eroded	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.16	Depth to water	1.00
5583:							
Nora, eroded	55	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.16	Depth to water	1.00
		Slope	0.02				
Crofton, eroded	35	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.63	Depth to water	1.00
		Slope	0.02				

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
5800:							
Omadi, rarely flooded	75	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Piping	0.51	Depth to water	0.96
						Slow refill	0.30
						Cutbanks cave	0.10
5814:							
Onawa, occasionally flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	0.95	Cutbanks cave	0.10
						Depth to water	0.02
5815:							
Onawa, occasionally flooded	75	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	0.95	Cutbanks cave	0.10
						Depth to water	0.01
				Piping	0.01		
6075:							
Percival, occasionally flooded	75	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.95	Cutbanks cave	1.00
						Depth to water	0.02
				Seepage	0.05		
6133:							
Platte, occasionally flooded	55	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.95	Cutbanks cave	1.00
						Depth to water	0.02
				Seepage	0.61		
6164:							
Pohocco, eroded	57	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.19	Depth to water	1.00
		Slope	0.02				
Monona, eroded	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
		Slope	0.02				
6178:							
Pohocco, eroded	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.19	Depth to water	1.00
		Slope	0.02				
Ida, eroded	30	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.68	Depth to water	1.00
		Slope	0.02				
6490:							
Salix, rarely flooded	80	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Piping	0.34	Depth to water	0.96
						Cutbanks cave	0.10

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
6660:							
Sarpy, occasionally flooded	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.30	Depth to water	1.00
6670:							
Sarpy, occasionally flooded	75	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.30	Depth to water	1.00
6906:							
Shell, occasionally flooded	95	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.35	Depth to water	1.00
8166:							
Zook, occasionally flooded	80	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
						Cutbanks cave	0.10
				Hard to pack	0.36		
8503:							
Monona	85	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
8504:							
Monona	80	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.43	Depth to water	1.00
8505:							
Fontanelle, depressional, frequently flooded	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	1.00
				Depth to saturated zone	1.00		
				Piping	0.28		
				Seepage	0.01		
8507:							
Onawet, depressional, frequently flooded	75	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	1.00
				Depth to saturated zone	1.00		
				Piping	0.28		
				Seepage	0.07		
8508:							
Onawa, occasionally flooded	50	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Depth to saturated zone	0.95	Cutbanks cave	0.10
						Depth to water	0.02
Haynie, occasionally flooded	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.97	Depth to water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
8510:							
Wathena, occasionally flooded	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.25	Cutbanks cave	1.00
						Depth to water	0.96
8511:							
Wathena, rarely flooded	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.25	Cutbanks cave	1.00
						Depth to water	0.96
8512:							
Gullied land	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Piping	0.32	Depth to water	1.00
		Seepage	0.72				
Napier	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.32	Depth to water	1.00
9900:							
Arents, earthen dams	100	Not rated		Not rated		Not rated	
9980:							
Mine or Quarry	100	Not rated		Not rated		Not rated	
9990:							
Aquolls	100	Not limited		Not rated		Not rated	
9995:							
Miscellaneous water	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: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
1074: Albaton, occasionally flooded--------	0-7	Silty clay, clay	CH	A-7	0	0	100	100	95-100	90-95	54-78	29-44
	7-47	Clay	CH	A-7	0	0	100	100	90-100	75-95	50-97	29-61
	47-65	Silty clay loam	CH	A-7-6	0	0	100	100	95-100	85-95	45-53	25-29
	65-80	Very fine sandy loam	CL-ML, SC-SM	A-4, A-2-4	0	0	100	100	85-100	30-80	16-29	2-12
1075: Albaton, depressional, frequently flooded--------	0-7	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	54-78	29-44
	7-60	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	60-74	37-45
1090: Alcester--------	0-15	Silt loam	CL	A-6	0	0	100	100	95-100	85-100	35-45	13-18
	15-34	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	90-100	33-47	13-22
	34-50	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	95-100	95-100	85-100	31-46	13-22
	50-60	Silty clay loam, silt loam	CL	A-7-6, A-6	0	0	100	95-100	95-100	85-100	29-44	13-23
1432: Belfore---------	0-14	Silty clay loam	CL, CH	A-7-6	0	0	100	100	100	95-100	41-57	19-28
	14-25	Silty clay, silty clay loam	CL, CH	A-7-6	0	0	100	100	100	95-100	46-56	25-31
	25-48	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	100	95-100	36-47	17-25
	48-60	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	100	95-100	35-46	17-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
1436:												
Belfore---------	0-14	Silty clay loam	CL, CH	A-7-6	0	0	100	100	100	95-100	41-57	19-28
	14-25	Silty clay, silty clay loam	CL, CH	A-7-6	0	0	100	100	100	95-100	46-56	25-31
	25-48	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	100	95-100	36-47	17-25
	48-60	Silty clay loam, silt loam	CL	A-7-6	0	0	100	100	100	95-100	35-46	17-25
1594:												
Blyburg, rarely flooded--------	0-11	Silty clay loam	CL	A-6	0	0	100	100	85-95	50-65	39-51	19-25
	11-15	Silt loam	CL-ML	A-4	0	0	100	100	90-100	70-95	22-35	6-13
	15-60	Stratified silt loam, very fine sandy loam	CL-ML	A-4, A-6	0	0	100	100	85-100	50-90	20-32	6-13
1859:												
Burchard, eroded	0-11	Clay loam	CL	A-7-6	0	0-5	95-100	95-100	85-95	60-80	41-48	19-21
	11-42	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	38-47	19-25
	42-78	Clay loam	CL	A-7-6, A-6	0	0-5	95-100	85-100	75-95	60-80	35-42	16-21
	78-93	Clay loam	CL	A-7-6, A-6	0	0-5	95-100	85-100	75-95	60-80	34-41	16-21
1879:												
Burchard, eroded	0-11	Clay loam	CL	A-7-6	0	0-5	95-100	95-100	85-95	60-80	41-48	19-21
	11-42	Clay loam	CL	A-7-6	0	0-5	95-100	85-100	75-95	60-80	38-47	19-25
	42-78	Clay loam	CL	A-7-6, A-6	0	0-5	95-100	85-100	75-95	60-80	35-42	16-21
	78-93	Clay loam	CL	A-7-6, A-6	0	0-5	95-100	85-100	75-95	60-80	34-41	16-21
Steinauer, eroded---------	0-6	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	55-90	38-46	19-22
	6-15	Clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	70-90	38-44	19-23
	15-60	Loam, clay loam	CL	A-6	0	0-5	95-100	95-100	85-100	60-75	34-46	16-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
2030: Cass, occasionally flooded--------	0-12	Fine sandy loam	SC, SC-SM	A-4	0	0	100	95-100	85-95	20-40	21-33	4-12
	12-47	Fine sandy loam, sandy loam, very fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	100	95-100	85-95	20-50	17-28	2-10
	47-60	Loamy fine sand, fine sand, coarse sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	50-75	5-30	0-23	NP-6
2041: Cass, occasionally flooded--------	0-12	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	85-95	60-75	22-37	6-13
	12-47	Fine sandy loam, sandy loam, very fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	100	95-100	85-95	20-50	17-28	2-10
	47-60	Loamy fine sand, fine sand, coarse sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	95-100	50-75	5-30	0-23	NP-6
2192: Cooper, rarely flooded--------	0-16	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	85-100	43-53	18-24
	16-24	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	39-48	19-24
	24-33	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	53-77	29-44
	33-60	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	53-77	29-44
2320: Crofton, eroded	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-41	13-19
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	13-19
	12-80	Silt loam	CL	A-6	0	0	100	95-100	95-100	95-100	25-38	9-19
2322: Crofton, eroded	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-41	13-19
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	13-19
	12-80	Silt loam	CL	A-6	0	0	100	95-100	95-100	95-100	25-38	9-19

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
2855: Fluvaquents, sandy, frequently flooded--------	0-5	Loamy sand, sandy loam, sand	SC-SM, SM, SP-SM	A-2-4, A-4	0	0	100	100	50-75	5-40	0-46	NP-12
	5-60	Stratified loamy sand, stratified sandy loam, stratified sand	SC-SM, SM, SP-SM	A-2-4, A-4	0	0	100	100	50-75	5-40	0-33	NP-12
	60-80	Stratified sand, loamy sand, gravelly sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	50-80	5-35	0-26	NP-6
2863: Fluvaquents, silty, frequently flooded--------	0-5	Silt loam, silty clay loam, loam	CL	A-6	0	0	100	100	85-100	60-95	32-55	12-25
	5-60	Stratified silt loam, stratified silty clay loam, stratified loam	CL, CL-ML	A-6, A-4	0	0	100	100	85-100	60-95	16-49	2-25
	60-80	Stratified silt loam, stratified silty clay loam, stratified loam	CL-ML, ML	A-4	0	0	100	100	85-100	60-95	16-49	2-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
2890:												
Forney, rarely flooded--------	0-8	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	95-100	34-46	13-19
	8-15	Silt loam	CL	A-6, A-7	0	0	100	100	95-100	95-100	29-43	13-19
	15-19	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	50-78	29-44
	19-29	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	64-78	36-44
	29-45	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	61-78	37-44
	45-60	Silty clay, clay	CH	A-7, A-7-6	0	0	100	100	95-100	95-100	60-75	37-45
3150:												
Grable, occasionally flooded--------	0-6	Silt loam	CL	A-6	0	0	100	100	80-95	80-95	30-43	12-19
	6-23	Silt loam	CL	A-4	0	0	100	100	80-95	80-95	22-29	7-10
	23-60	Stratified fine sand, stratified sand	SM	A-2-4, A-3	0	0	100	100	65-80	5-35	0-23	NP-6
3410:												
Haynie, occasionally flooded--------	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	85-100	70-100	27-41	9-17
	7-60	Silt loam, very fine sandy loam	CL	A-4	0	0	100	100	85-100	85-100	24-31	9-12
3812:												
Ida, eroded-----	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	12-17
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	29-38	12-17
	12-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-36	12-17
3822:												
Ida, eroded-----	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	12-17
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	29-38	12-17
	12-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-36	12-17

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
3892: Inglewood, rarely flooded	0-5	Loamy fine sand	SM, SC-SM	A-2-4	0	0	100	100	50-80	15-35	0-24	NP-6
	5-40	Stratified sand to fine sandy loam	SM, SC-SM, SP-SM	A-2-4, A-3	0	0	100	100	50-85	5-55	0-23	NP-6
	40-50	Fine sand, sand, loamy fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	50-80	5-35	0-19	NP-2
	50-80	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	50-80	5-35	0-19	NP-2
4112: Judson----------	0-30	Silty clay loam	ML, MH	A-7	0	0	100	100	100	95-100	45-53	18-22
	30-38	Silty clay loam	CL	A-7	0	0	100	100	100	95-100	41-49	19-23
	38-60	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	42-51	21-25
	60-75	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	40-47	21-25
4230: Kennebec, occasionally flooded--------	0-18	Silt loam	ML	A-7-6	0	0	100	100	95-100	90-100	42-50	14-20
	18-41	Silt loam	ML	A-7-6	0	0	100	100	95-100	90-100	42-50	14-20
	41-60	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	90-100	36-42	16-19
4287: Kezan, occasionally flooded--------	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	70-90	34-46	13-19
	6-13	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	36-51	16-25
	13-32	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	35-47	16-25
	32-60	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	36-51	16-25

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
4288:												
Kezan, occasionally flooded--------	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	70-90	34-46	13-19
	6-13	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	36-51	16-25
	13-32	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	35-47	16-25
	32-60	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	80-95	36-51	16-25
Kennebec, occasionally flooded--------	0-18	Silt loam	ML	A-7-6	0	0	100	100	95-100	90-100	42-50	14-20
	18-41	Silt loam	ML	A-7-6	0	0	100	100	95-100	90-100	42-50	14-20
	41-60	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	90-100	36-42	16-19
4780:												
Luton, rarely flooded--------	0-12	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	56-82	29-44
	12-24	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	54-80	29-44
	24-33	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	52-100	29-60
	33-43	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	51-99	29-61
	43-50	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	51-74	29-45
	50-60	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	51-97	29-61
4956:												
Marshall--------	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	43-53	18-25
	7-18	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	39-50	19-24
	18-47	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	37-46	19-24
	47-68	Silty clay loam, silt loam	CL	A-6	0	0	100	100	100	95-100	31-41	15-21

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
4961:												
Marshall--------	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	43-53	18-25
	7-18	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	39-50	19-24
	18-47	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	37-46	19-24
	47-68	Silty clay loam, silt loam	CL	A-6	0	0	100	100	100	95-100	31-41	15-21
4974:												
Marshall, eroded	0-7	Silty clay loam	CL	A-7-6	0	0	100	100	100	95-100	43-53	18-25
	7-18	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	39-50	19-24
	18-47	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	100	95-100	37-46	19-24
	47-68	Silty clay loam, silt loam	CL	A-6	0	0	100	100	100	95-100	31-41	15-21
Pohocco, eroded	0-6	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	38-49	19-25
	6-15	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	15-28	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	28-80	Silt loam	CL	A-6	0	0	100	100	100	95-100	29-38	13-19
5321:												
Monona----------	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16
5343:												
Monona, eroded--	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16
Ida, eroded-----	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	12-17
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	29-38	12-17
	12-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-36	12-17

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	
5348:												
Monona, eroded--	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16
Pohocco, eroded	0-6	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	38-49	19-25
	6-15	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	15-28	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	28-80	Silt loam	CL	A-6	0	0	100	100	100	95-100	29-38	13-19
5358:												
Moody-----------	0-17	Silty clay loam	CH, CL	A-7-6	0	0	100	100	95-100	95-100	41-53	19-25
	17-62	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	95-100	37-47	19-25
	62-70	Silt loam	CL	A-6	0	0	100	100	95-100	85-100	30-39	13-19
	70-98	Silt loam	CL	A-6	0	0	100	100	95-100	85-100	28-36	12-17
5415:												
Moville, rarely flooded--------	0-6	Silt loam	CL	A-4	0	0	100	100	95-100	90-100	22-35	6-12
	6-27	Stratified silt loam	CL	A-4	0	0	100	100	95-100	90-100	21-31	6-12
	27-45	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	66-80	36-44
	45-60	Silty clay, clay	CH	A-7	0	0	100	100	95-100	95-100	62-76	36-45
5493:												
Napier----------	0-29	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	35-46	13-19
	29-48	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	33-42	13-19
	48-65	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-41	13-19
Nodaway, occasionally flooded--------	0-7	Silt loam	CL	A-6	0	0	100	95-100	95-100	90-100	32-43	12-19
	7-60	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	95-100	95-100	90-100	28-41	12-21

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
5493:												
Gullied land----	0-6	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	28-39	12-19
	6-60	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	27-38	12-19
5575:												
Nora, eroded----	0-9	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	41-53	19-25
	9-22	Silty clay loam, silt loam	CL	A-7-6	0	0	95-100	95-100	95-100	85-100	30-47	13-25
	22-54	Silt loam, silty clay loam	CL	A-6	0	0	95-100	95-100	95-100	85-100	28-42	12-21
	54-80	Silt loam, silty clay loam	CL	A-6	0	0	95-100	95-100	95-100	85-100	28-41	12-21
5583:												
Nora, eroded----	0-9	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	41-53	19-25
	9-22	Silty clay loam, silt loam	CL	A-7-6	0	0	95-100	95-100	95-100	85-100	30-47	13-25
	22-54	Silt loam, silty clay loam	CL	A-6	0	0	95-100	95-100	95-100	85-100	28-42	12-21
	54-80	Silt loam, silty clay loam	CL	A-6	0	0	95-100	95-100	95-100	85-100	28-41	12-21
Crofton, eroded	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-41	13-19
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	13-19
	12-80	Silt loam	CL	A-6	0	0	100	95-100	95-100	95-100	25-38	9-19
5800:												
Omadi, rarely flooded--------	0-12	Silt loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	24-36	5-16
	12-20	Stratified silt loam	CL	A-4, A-6	0	0	100	100	95-100	90-100	23-39	7-19
	20-80	Stratified silt loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	29-42	12-21

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
5814: Onawa, occasionally flooded--------	0-7	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	54-72	29-40
	7-22	Silty clay, clay	CH	A-7-6	0	0	100	100	95-100	95-100	60-74	37-45
	22-60	Silt loam, very fine sandy loam, loam	CL	A-6	0	0	100	100	95-100	85-100	22-30	7-12
5815: Onawa, occasionally flooded--------	0-7	Silty clay loam	CH	A-7-6	0	0	100	100	95-100	95-100	52-57	27-29
	7-22	Silty clay, clay	CH	A-7-6	0	0	100	100	95-100	95-100	60-74	37-45
	22-60	Silt loam, very fine sandy loam, loam	CL	A-6	0	0	100	100	95-100	85-100	22-30	7-12
6075: Percival, occasionally flooded--------	0-8	Silty clay	CH	A-7-6	0	0	100	100	95-100	95-100	56-76	35-50
	8-24	Silty clay, clay	CH	A-7-6	0	0	100	100	95-100	95-100	56-76	29-50
	24-60	Stratified fine sand to loamy fine sand	SM, SC-SM	A-2-4	0	0	100	100	80-95	12-30	0-28	NP-11

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
6133:												
Platte, occasionally flooded--------	0-5	Loam, fine sandy loam, silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	60-95	22-37	6-13
	5-8	Very fine sandy loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	75-95	45-75	22-37	6-13
	8-16	Very fine sandy loam, loam, fine sandy loam, sandy loam	SC-SM, SM, CL-ML, ML	A-4	0	0	100	95-100	75-95	45-75	18-30	3-12
	16-80	Gravelly coarse sand, coarse sand, gravelly sand	SP-SM, SM, SW, SP	A-1-b, A-2-4, A-3	0	0	70-100	50-95	25-65	0-15	0-17	NP-1
6164:												
Pohocco, eroded	0-6	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	38-49	19-25
	6-15	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	15-28	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	28-80	Silt loam	CL	A-6	0	0	100	100	100	95-100	29-38	13-19
Monona, eroded--	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16
6178:												
Pohocco, eroded	0-6	Silty clay loam	CL	A-6	0	0	100	100	100	95-100	38-49	19-25
	6-15	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	15-28	Silt loam, silty clay loam	CL	A-6	0	0	100	100	100	95-100	30-47	13-25
	28-80	Silt loam	CL	A-6	0	0	100	100	100	95-100	29-38	13-19

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
6178:												
Ida, eroded-----	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	30-39	12-17
	6-12	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	29-38	12-17
	12-80	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-36	12-17
6490:												
Salix, rarely flooded--------	0-15	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	43-48	18-21
	15-25	Silty clay loam	CL	A-7-6	0	0	100	100	95-100	95-100	40-52	19-27
	25-33	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	27-36	10-15
	33-60	Silt loam, loam, very fine sandy loam	CL	A-6	0	0	100	100	95-100	90-100	25-34	10-15
6660:												
Sarpy, occasionally flooded--------	0-6	Fine sand	SP-SM, SP	A-3, A-2-4	0	0	100	100	60-80	2-15	0-20	NP-2
	6-60	Fine sand, loamy fine sand, sand	SM, SP-SM, SP	A-2-4, A-3	0	0	100	100	60-80	2-35	0-19	NP-2
6670:												
Sarpy, occasionally flooded--------	0-6	Loamy fine sand	SM	A-2-4	0	0	100	100	60-80	15-35	0-20	NP-2
	6-60	Fine sand, loamy fine sand, sand	SM, SP-SM, SP	A-2-4, A-3	0	0	100	100	60-80	2-35	0-19	NP-2

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
6906: Shell, occasionally flooded--------	0-24	Silt loam	CL	A-6, A-4	0	0	100	100	95-100	90-100	29-45	9-18
	24-33	Stratified silt loam, stratified silty clay loam, stratified loam	CL	A-6	0	0	100	100	95-100	90-100	30-42	13-21
	33-60	Stratified silt loam, stratified loam, stratified silty clay loam	CL	A-6	0	0	100	100	95-100	90-100	29-41	13-21
8166: Zook, occasionally flooded--------	0-20	Silty clay loam	MH	A-7	0	0	100	100	95-100	95-100	49-65	25-28
	20-52	Silty clay, silty clay loam	CH	A-7	0	0	100	100	95-100	95-100	48-63	26-32
	52-60	Silty clay, silty clay loam, silt loam	CH, CL	A-7-6, A-6	0	0	100	100	95-100	95-100	33-57	14-33
8503: Monona----------	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16
8504: Monona----------	0-7	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	34-44	13-19
	7-15	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-42	13-19
	15-30	Silt loam, silty clay loam	CL	A-6	0	0	100	100	95-100	95-100	32-41	15-19
	30-60	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	28-35	12-16

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
8505:												
Fontanelle, depressional, frequently flooded--------	0-7	Silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	85-95	41-58	19-28
	7-13	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	34-53	13-25
	13-22	Silt loam, loam	CL-ML, CL	A-6, A-4	0	0	100	100	70-100	50-95	21-37	6-17
	22-41	Stratified fine sandy loam to loam to silt loam to silty clay loam, stratified fine sand to fine sandy loam to silt loam to silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	40-95	0-41	NP-21
	41-48	Stratified fine sandy loam to loam to silt loam, stratified loam	CL	A-6	0	0	100	100	70-100	40-95	26-37	9-17
	48-60	Silty clay loam, silt loam, silty clay loam	CL	A-7	0	0	100	100	85-100	60-95	35-58	13-28
	60-80	Silt loam, loam, silt loam, silty clay loam	CL	A-6	0	0	100	100	55-100	55-95	30-44	13-23

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
8507: Onawet, depressional, frequently flooded--------	0-7	Silty clay, silty clay loam, silt loam	CH	A-7	0	0	100	100	90-100	70-95	54-82	29-48
	7-24	Silty clay, clay	CH	A-7	0	0	100	100	90-100	75-95	52-80	29-48
	24-39	Very fine sandy loam, silt loam, loam	CL	A-6, A-4	0	0	100	100	70-100	40-90	19-33	3-12
	39-56	Silt loam, very fine sandy loam, loam	CL	A-6, A-4	0	0	100	100	70-100	40-90	19-41	3-19
	56-80	Loamy fine sand, loamy sand, fine sand	SM, SC-SM	A-2-4, A-4	0	0	100	100	50-100	10-55	0-27	NP-10
8508: Onawa, occasionally flooded--------	0-7	Silty clay	CH	A-7	0	0	100	100	95-100	95-100	54-72	29-40
	7-22	Silty clay, clay	CH	A-7-6	0	0	100	100	95-100	95-100	60-74	37-45
	22-60	Silt loam, very fine sandy loam, loam	CL	A-6	0	0	100	100	95-100	85-100	22-30	7-12
Haynie, occasionally flooded--------	0-7	Silt loam	CL	A-4, A-6	0	0	100	100	85-100	70-100	27-41	9-17
	7-60	Silt loam, very fine sandy loam	CL	A-4	0	0	100	100	85-100	85-100	24-31	9-12

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
8510: Wathena, occasionally flooded--------	0-6	Fine sandy loam	SC-SM, CL-ML, SM, ML	A-2-4, A-4	0	0	100	100	55-90	15-70	0-31	NP-12
	6-14	Loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-100	10-55	0-28	NP-10
	14-21	Fine sand	SP-SM, SC-SM, SM	A-2-4, A-2, A-4	0	0	100	100	75-100	0-40	0-23	NP-6
	21-36	Stratified very fine sandy loam, stratified very fine sandy loam to silt loam	CL	A-4, A-6	0	0	100	100	50-100	50-100	0-38	NP-19
	36-58	Stratified fine sand	SP-SM, SC-SM, SM	A-2-4, A-4	0	0	100	100	75-100	0-40	0-23	NP-6
	58-69	Stratified very fine sandy loam	CL-ML, SC-SM, SM, ML	A-4, A-2-4	0	0	100	100	85-100	30-80	16-29	2-12
8511: Wathena, rarely flooded--------	0-6	Fine sandy loam	SC-SM, CL-ML, SM, ML	A-2-4, A-4	0	0	100	100	55-90	15-70	0-31	NP-12
	6-14	Loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-100	10-55	0-28	NP-10
	14-21	Fine sand	SP-SM, SC-SM, SM	A-2-4, A-2, A-4	0	0	100	100	75-100	0-40	0-23	NP-6
	21-36	Stratified very fine sandy loam, stratified very fine sandy loam to silt loam	CL	A-4, A-6	0	0	100	100	50-100	50-100	0-38	NP-19
	36-58	Stratified fine sand	SP-SM, SC-SM, SM	A-2-4, A-4	0	0	100	100	75-100	0-40	0-23	NP-6
	58-69	Stratified very fine sandy loam	CL-ML, SC-SM, SM, ML	A-4, A-2-4	0	0	100	100	85-100	30-80	16-29	2-12
8512: Gullied land----	0-6	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	28-39	12-19
	6-60	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	27-38	12-19

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	
8512:												
Napier----------	0-29	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	35-46	13-19
	29-48	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	33-42	13-19
	48-65	Silt loam	CL	A-6	0	0	100	100	95-100	95-100	31-41	13-19
9900. Arents, earthen dams												
9980. Mine or Quarry												
9990:												
Aquolls---------	0-60	Variable	---	---	---	---	---	---	---	---	---	---
9995. Miscellaneous water												
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. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
									Kw	Kf	T		
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
1074:													
Albaton, occasionally flooded------------	0-7	0-20	40-60	1.35-1.40	0.01-0.06	0.10-0.14	7.0-15.0	2.0-3.0	.28	.28	5	4	86
	7-47	0-30	40-80	1.35-1.45	0.01-0.06	0.08-0.12	7.0-25.0	0.0-1.0	.28	.28			
	47-65	0-20	35-40	1.35-1.45	0.06-0.2	0.16-0.18	6.0-8.0	0.0-1.0	.28	.28			
	65-80	45-85	5-18	1.20-1.40	2-13	0.16-0.18	0.0-2.9	0.0-0.0	.15	.15			
1075:													
Albaton, depressional, frequently flooded	0-7	0-20	40-60	1.35-1.40	0.01-0.06	0.10-0.14	7.0-15.0	2.0-3.0	.28	.28	5	8	0
	7-60	0-20	50-60	1.35-1.45	0.01-0.04	0.08-0.12	9.0-15.0	0.0-1.0	.28	.28			
1090:													
Alcester------------	0-15	2-15	20-26	1.20-1.35	0.6-2	0.20-0.23	1.0-4.0	2.5-4.0	.28	.28	5	6	48
	15-34	2-15	20-32	1.20-1.35	0.4-2	0.19-0.22	1.3-4.5	1.5-2.5	.43	.43			
	34-50	2-15	20-32	1.30-1.45	0.4-2	0.17-0.20	1.3-4.5	0.8-2.0	.43	.43			
	50-60	2-15	20-32	1.30-1.45	0.4-2	0.17-0.20	1.3-4.5	0.0-1.0	.43	.43			
1432:													
Belfore-------------	0-14	2-15	27-39	1.30-1.50	0.06-0.6	0.21-0.24	3.0-7.0	2.0-4.0	.32	.32	5	6	48
	14-25	2-15	35-43	1.20-1.40	0.05-0.2	0.11-0.16	6.0-8.9	0.5-1.0	.43	.43			
	25-48	2-15	25-35	1.20-1.40	0.2-0.9	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	48-60	2-15	25-35	1.30-1.50	0.2-0.9	0.18-0.22	3.0-5.9	0.0-0.5	.43	.43			
1436:													
Belfore-------------	0-14	2-15	27-39	1.30-1.50	0.06-0.6	0.21-0.24	3.0-7.0	2.0-4.0	.32	.32	5	6	48
	14-25	2-15	35-43	1.20-1.40	0.05-0.2	0.11-0.16	6.0-8.9	0.5-1.0	.43	.43			
	25-48	2-15	25-35	1.20-1.40	0.2-0.9	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	48-60	2-15	25-35	1.30-1.50	0.2-0.9	0.18-0.22	3.0-5.9	0.0-0.5	.43	.43			
1594:													
Blyburg, rarely flooded------------	0-11	5-20	27-35	1.25-1.60	0.2-0.6	0.21-0.24	3.0-5.9	1.0-3.0	.32	.32	5	4	86
	11-15	5-50	10-20	1.20-1.40	2-6	0.20-0.23	0.0-2.9	1.0-2.0	.32	.32			
	15-60	5-85	10-20	1.30-1.50	2-6	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
1859:													
Burchard, eroded----	0-11	20-45	27-30	1.25-1.45	0.4-0.9	0.19-0.22	3.0-4.5	2.0-4.0	.28	.28	5	6	48
	11-42	20-45	27-35	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	42-78	20-45	24-30	1.40-1.60	0.4-0.9	0.16-0.18	2.3-4.5	0.5-1.0	.37	.37			
	78-93	20-45	24-30	1.55-1.65	0.4-0.9	0.16-0.18	2.3-4.5	0.0-0.5	.37	.37			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
1879:													
Burchard, eroded----	0-11	20-45	27-30	1.25-1.45	0.4-0.9	0.19-0.22	3.0-4.5	2.0-4.0	.28	.28	5	6	48
	11-42	20-45	27-35	1.40-1.60	0.2-0.6	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	42-78	20-45	24-30	1.40-1.60	0.4-0.9	0.16-0.18	2.3-4.5	0.5-1.0	.37	.37			
	78-93	20-45	24-30	1.55-1.65	0.4-0.9	0.16-0.18	2.3-4.5	0.0-0.5	.37	.37			
Steinauer, eroded---	0-6	20-45	27-32	1.20-1.35	0.4-0.6	0.19-0.22	3.0-4.5	0.5-2.0	.32	.32	5	4L	86
	6-15	20-45	27-32	1.30-1.50	0.4-0.6	0.19-0.22	3.0-4.5	0.5-1.0	.37	.37			
	15-60	20-52	24-35	1.30-1.65	0.2-0.9	0.17-0.19	2.3-5.9	0.0-0.5	.37	.37			
2030:													
Cass, occasionally flooded-----------	0-12	45-85	8-18	1.40-1.60	2-13	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	12-47	45-85	5-15	1.40-1.60	2-13	0.15-0.17	0.0-2.9	0.5-1.0	.28	.28			
	47-60	70-90	2-10	1.50-1.70	6-20	0.08-0.10	0.0-2.9	0.0-0.5	.17	.17			
2041:													
Cass, occasionally flooded-----------	0-12	25-52	10-20	1.20-1.40	2-6	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	12-47	45-85	5-15	1.40-1.60	2-13	0.15-0.17	0.0-2.9	0.5-1.0	.28	.28			
	47-60	70-90	2-10	1.50-1.70	6-20	0.08-0.10	0.0-2.9	0.0-0.5	.17	.17			
2192:													
Cooper, rarely flooded-----------	0-16	0-20	27-34	1.25-1.30	0.2-0.6	0.21-0.23	3.0-5.9	3.0-4.0	.32	.32	5	6	48
	16-24	0-20	27-34	1.30-1.35	0.2-0.6	0.18-0.20	3.0-5.9	1.0-2.0	.28	.28			
	24-33	0-20	40-60	1.35-1.40	0.01-0.06	0.10-0.12	7.0-15.0	1.5-2.5	.28	.28			
	33-60	0-20	40-60	1.35-1.40	0.01-0.06	0.10-0.12	7.0-15.0	1.5-2.5	.28	.28			
2320:													
Crofton, eroded-----	0-6	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-2.0	.43	.43	5	4L	86
	6-12	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-1.0	.43	.43			
	12-80	2-15	15-27	1.10-1.20	0.6-4	0.18-0.22	1.0-3.5	0.0-0.5	.43	.43			
2322:													
Crofton, eroded-----	0-6	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-2.0	.43	.43	5	4L	86
	6-12	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-1.0	.43	.43			
	12-80	2-15	15-27	1.10-1.20	0.6-4	0.18-0.22	1.0-3.5	0.0-0.5	.43	.43			
2855:													
Fluvaquents, sandy, frequently flooded	0-5	70-90	1-18	1.30-1.60	6-20	0.10-0.12	0.0-3.0	2.0-8.0	.17	.17	5	8	0
	5-60	70-90	1-18	1.30-1.60	6-20	0.08-0.11	0.0-3.0	0.0-2.0	.17	.17			
	60-80	85-100	1-10	1.30-1.80	6-20	0.05-0.07	0.0-3.0	0.0-2.0	.17	.17			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
									Kw	Kf	T		
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
2863:													
Fluvaquents, silty, frequently flooded	0-5	0-40	18-35	1.35-1.65	0.2-2	0.20-0.23	1.0-5.9	2.0-5.0	.28	.28	5	8	0
	5-60	0-40	5-35	1.35-1.65	0.2-13	0.18-0.20	0.0-5.9	0.0-2.0	.28	.28			
	60-80	10-40	5-35	1.40-1.65	0.2-13	0.18-0.20	0.0-5.9	0.0-2.0	.28	.28			
2890:													
Forney, rarely flooded------------	0-8	5-50	20-27	1.25-1.30	0.6-2	0.20-0.23	1.0-4.0	2.4-4.0	.43	.43	5	4L	86
	8-15	5-50	20-27	1.25-1.30	0.6-2	0.20-0.23	1.0-4.0	0.0-3.0	.43	.43			
	15-19	0-20	40-60	1.30-1.35	0.01-0.06	0.10-0.12	7.0-15.0	0.0-3.0	.28	.28			
	19-29	0-20	50-60	1.35-1.45	0.01-0.04	0.10-0.12	9.0-15.0	2.0-3.0	.28	.28			
	29-45	0-20	50-60	1.35-1.45	0.01-0.04	0.10-0.12	9.0-15.0	0.8-3.0	.28	.28			
	45-60	0-20	50-60	1.35-1.45	0.01-0.04	0.10-0.12	9.0-15.0	0.0-1.5	.28	.28			
3150:													
Grable, occasionally flooded------------	0-6	5-50	18-27	1.20-1.25	0.6-2	0.22-0.24	1.0-4.0	1.0-3.0	.32	.32	4	4L	86
	6-23	5-50	12-16	1.25-1.50	3-4	0.20-0.22	0.0-2.9	0.0-1.0	.43	.43			
	23-60	85-100	2-10	1.20-1.50	6-20	0.05-0.08	0.0-2.9	0.0-0.5	.15	.15			
3410:													
Haynie, occasionally flooded------------	0-7	5-50	15-25	1.20-1.35	0.9-4	0.20-0.23	0.0-2.9	1.0-3.0	.32	.32	5	4L	86
	7-60	5-50	15-18	1.20-1.35	2-4	0.18-0.20	0.0-2.9	0.0-1.0	.43	.43			
3812:													
Ida, eroded---------	0-6	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	1.0-2.0	.32	.32	4	4L	86
	6-12	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	0.5-1.5	.43	.43			
	12-80	2-10	18-25	1.20-1.30	0.9-2	0.18-0.22	1.0-2.9	0.0-0.5	.43	.43			
3822:													
Ida, eroded---------	0-6	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	1.0-2.0	.32	.32	4	4L	86
	6-12	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	0.5-1.5	.43	.43			
	12-80	2-10	18-25	1.20-1.30	0.9-2	0.18-0.22	1.0-2.9	0.0-0.5	.43	.43			
3892:													
Inglewood, rarely flooded------------	0-5	72-88	2-10	1.45-1.65	6-20	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	5-40	60-95	1-10	1.45-1.65	6-20	0.06-0.14	0.0-2.9	0.0-0.5	.17	.17			
	40-50	85-99	0-5	1.50-1.70	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			
	50-80	85-99	0-5	1.50-1.70	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodibility group	Wind erodibility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
4112:													
Judson---------------	0-30	2-10	27-32	1.30-1.35	0.3-0.6	0.21-0.23	3.0-5.9	2.8-3.2	.28	.28	5	6	48
	30-38	2-10	27-32	1.30-1.35	0.3-0.6	0.18-0.20	3.0-5.9	1.2-2.0	.28	.28			
	38-60	2-10	30-35	1.35-1.45	0.2-0.6	0.18-0.20	4.0-5.9	0.7-1.0	.43	.43			
	60-75	2-10	30-35	1.35-1.45	0.2-0.6	0.18-0.20	4.0-5.9	0.5-1.0	.43	.43			
4230:													
Kennebec, occasionally flooded------------	0-18	5-25	22-27	1.25-1.35	0.6-1	0.22-0.24	1.6-4.0	2.0-4.5	.28	.28	5	6	48
	18-41	5-25	22-27	1.25-1.35	0.6-1	0.18-0.20	1.6-4.0	1.8-2.5	.28	.28			
	41-60	5-25	24-28	1.35-1.40	0.6-1	0.18-0.20	2.3-3.5	0.8-2.0	.43	.43			
4287:													
Kezan, occasionally flooded------------	0-6	2-25	20-27	1.20-1.40	0.6-2	0.22-0.24	1.0-4.0	2.0-4.0	.32	.32	5	6	48
	6-13	5-25	24-35	1.20-1.40	0.2-1	0.20-0.23	2.3-6.0	1.0-3.0	.32	.32			
	13-32	5-25	24-35	1.20-1.40	0.2-1	0.18-0.20	2.3-6.0	0.5-1.0	.43	.43			
	32-60	5-25	24-35	1.20-1.40	0.2-1	0.18-0.22	2.3-6.0	1.0-3.0	.43	.43			
4288:													
Kezan, occasionally flooded------------	0-6	2-25	20-27	1.20-1.40	0.6-2	0.22-0.24	1.0-4.0	2.0-4.0	.32	.32	5	6	48
	6-13	5-25	24-35	1.20-1.40	0.2-1	0.20-0.23	2.3-6.0	1.0-3.0	.32	.32			
	13-32	5-25	24-35	1.20-1.40	0.2-1	0.18-0.20	2.3-6.0	0.5-1.0	.43	.43			
	32-60	5-25	24-35	1.20-1.40	0.2-1	0.18-0.22	2.3-6.0	1.0-3.0	.43	.43			
Kennebec, occasionally flooded------------	0-18	5-25	22-27	1.25-1.35	0.6-1	0.22-0.24	1.6-4.0	2.0-4.5	.28	.28	5	6	48
	18-41	5-25	22-27	1.25-1.35	0.6-1	0.18-0.20	1.6-4.0	1.8-2.5	.28	.28			
	41-60	5-25	24-28	1.35-1.40	0.6-1	0.18-0.20	2.3-3.5	0.8-2.0	.43	.43			
4780:													
Luton, rarely flooded------------	0-12	0-20	40-60	1.30-1.35	0.01-0.06	0.10-0.17	7.0-15.0	1.5-5.0	.28	.28	5	4	86
	12-24	0-20	40-60	1.35-1.45	0.01-0.06	0.10-0.16	7.0-15.0	0.8-2.0	.28	.28			
	24-33	0-20	40-80	1.35-1.45	0.01-0.06	0.08-0.12	7.0-25.0	1.0-2.0	.28	.28			
	33-43	0-20	40-80	1.35-1.45	0.01-0.06	0.08-0.12	7.0-25.0	0.0-1.0	.28	.28			
	43-50	0-20	40-60	1.35-1.45	0.01-0.06	0.08-0.12	7.0-15.0	0.0-1.0	.28	.28			
	50-60	0-20	40-80	1.35-1.45	0.01-0.06	0.08-0.12	7.0-25.0	0.0-1.0	.28	.28			
4956:													
Marshall------------	0-7	2-10	27-35	1.25-1.30	0.2-0.6	0.21-0.23	3.0-5.9	2.5-3.5	.28	.32	5	6	48
	7-18	2-10	27-34	1.30-1.35	0.2-0.6	0.21-0.23	3.0-5.9	1.0-2.5	.32	.32			
	18-47	2-10	27-34	1.30-1.35	0.2-0.6	0.18-0.20	3.0-5.9	0.2-2.0	.43	.43			
	47-68	2-10	22-30	1.30-1.40	0.4-1	0.18-0.20	1.6-4.5	0.2-0.2	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
4961:													
Marshall------------	0-7	2-10	27-35	1.25-1.30	0.2-0.6	0.21-0.23	3.0-5.9	2.5-3.5	.28	.32	5	6	48
	7-18	2-10	27-34	1.30-1.35	0.2-0.6	0.21-0.23	3.0-5.9	1.0-2.5	.32	.32			
	18-47	2-10	27-34	1.30-1.35	0.2-0.6	0.18-0.20	3.0-5.9	0.2-2.0	.43	.43			
	47-68	2-10	22-30	1.30-1.40	0.4-1	0.18-0.20	1.6-4.5	0.2-0.2	.43	.43			
4974:													
Marshall, eroded----	0-7	2-10	27-35	1.25-1.30	0.2-0.6	0.21-0.23	3.0-5.9	2.5-3.5	.28	.32	5	6	48
	7-18	2-10	27-34	1.30-1.35	0.2-0.6	0.21-0.23	3.0-5.9	1.0-2.5	.32	.32			
	18-47	2-10	27-34	1.30-1.35	0.2-0.6	0.18-0.20	3.0-5.9	0.2-2.0	.43	.43			
	47-68	2-10	22-30	1.30-1.40	0.4-1	0.18-0.20	1.6-4.5	0.2-0.2	.43	.43			
Pohocco, eroded-----	0-6	2-10	27-35	1.35-1.40	0.2-0.6	0.21-0.23	3.0-5.9	0.5-2.0	.37	.37	5	6	48
	6-15	2-12	20-35	1.35-1.45	0.2-2	0.18-0.22	1.0-5.9	0.5-1.0	.43	.43			
	15-28	2-12	20-35	1.35-1.45	0.2-2	0.18-0.20	1.0-5.9	0.5-1.0	.43	.43			
	28-80	2-12	20-27	1.35-1.40	0.6-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			
5321:													
Monona--------------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			
5343:													
Monona, eroded------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			
Ida, eroded---------	0-6	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	1.0-2.0	.32	.32	4	4L	86
	6-12	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	0.5-1.5	.43	.43			
	12-80	2-10	18-25	1.20-1.30	0.9-2	0.18-0.22	1.0-2.9	0.0-0.5	.43	.43			
5348:													
Monona, eroded------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			
Pohocco, eroded-----	0-6	2-10	27-35	1.35-1.40	0.2-0.6	0.21-0.23	3.0-5.9	0.5-2.0	.37	.37	5	6	48
	6-15	2-12	20-35	1.35-1.45	0.2-2	0.18-0.22	1.0-5.9	0.5-1.0	.43	.43			
	15-28	2-12	20-35	1.35-1.45	0.2-2	0.18-0.20	1.0-5.9	0.5-1.0	.43	.43			
	28-80	2-12	20-27	1.35-1.40	0.6-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
5358:													
Moody---------------	0-17	2-15	27-35	1.20-1.30	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.32	.32	5	6	48
	17-62	2-15	27-35	1.20-1.30	0.2-0.9	0.18-0.20	2.3-5.9	0.5-1.0	.43	.43			
	62-70	2-15	20-27	1.20-1.30	0.6-2	0.18-0.20	1.0-4.2	0.2-1.0	.43	.43			
	70-98	2-15	18-25	1.20-1.30	0.9-2	0.18-0.20	1.0-2.6	0.0-0.5	.43	.43			
5415:													
Moville, rarely flooded------------	0-6	5-25	10-18	1.25-1.30	2-6	0.20-0.23	0.0-2.9	1.0-3.0	.37	.37	4	4L	86
	6-27	5-25	10-18	1.25-1.30	2-6	0.18-0.20	0.0-2.9	0.5-1.0	.37	.37			
	27-45	0-20	50-60	1.35-1.45	0.01-0.04	0.10-0.12	9.0-15.0	3.0-4.0	.28	.28			
	45-60	0-20	50-60	1.35-1.45	0.01-0.04	0.08-0.12	9.0-15.0	1.0-2.0	.28	.28			
5493:													
Napier--------------	0-29	2-10	20-27	1.20-1.25	0.6-2	0.22-0.24	1.0-4.0	2.5-4.0	.28	.28	5	6	48
	29-48	2-10	20-27	1.25-1.30	0.6-2	0.18-0.20	1.0-4.0	1.5-2.5	.43	.43			
	48-65	2-10	20-27	1.25-1.30	0.6-2	0.18-0.20	1.0-4.0	0.8-2.0	.43	.43			
Nodaway, occasionally flooded------------	0-7	5-25	18-27	1.25-1.35	0.6-2	0.20-0.23	1.0-4.0	2.0-3.0	.32	.32	5	6	48
	7-60	5-25	18-30	1.25-1.35	0.4-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			
Gullied land--------	0-6	2-10	18-27	1.20-1.45	0.6-2	0.20-0.22	0.0-4.0	0.5-1.0	.43	.43	4	4L	86
	6-60	2-10	18-27	1.40-1.65	0.6-2	0.18-0.20	0.0-4.0	0.0-0.5	.43	.43			
5575:													
Nora, eroded--------	0-9	2-15	27-35	1.20-1.25	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.32	5	6	48
	9-22	2-15	20-35	1.25-1.35	0.2-2	0.17-0.20	1.0-5.9	0.5-1.0	.43	.43			
	22-54	2-15	18-30	1.30-1.45	0.4-2	0.17-0.20	1.0-4.0	0.2-1.0	.43	.43			
	54-80	2-15	18-30	1.30-1.45	0.4-2	0.17-0.20	1.0-4.0	0.0-0.5	.43	.43			
5583:													
Nora, eroded--------	0-9	2-15	27-35	1.20-1.25	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.32	5	6	48
	9-22	2-15	20-35	1.25-1.35	0.2-2	0.17-0.20	1.0-5.9	0.5-1.0	.43	.43			
	22-54	2-15	18-30	1.30-1.45	0.4-2	0.17-0.20	1.0-4.0	0.2-1.0	.43	.43			
	54-80	2-15	18-30	1.30-1.45	0.4-2	0.17-0.20	1.0-4.0	0.0-0.5	.43	.43			
Crofton, eroded-----	0-6	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-2.0	.43	.43	5	4L	86
	6-12	2-15	20-27	1.20-1.30	0.6-2	0.21-0.24	1.0-4.0	0.5-1.0	.43	.43			
	12-80	2-15	15-27	1.10-1.20	0.6-4	0.18-0.22	1.0-3.5	0.0-0.5	.43	.43			
5800:													
Omadi, rarely flooded------------	0-12	5-25	12-27	1.30-1.40	0.6-4	0.20-0.23	0.0-3.5	1.0-2.0	.32	.32	5	5	56
	12-20	5-25	12-27	1.30-1.40	0.6-4	0.18-0.20	0.0-3.5	0.5-1.0	.32	.32			
	20-80	5-25	18-30	1.20-1.30	0.4-2	0.18-0.20	1.0-4.0	0.5-1.0	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
5814:													
Onawa, occasionally flooded------------	0-7	0-20	40-55	1.30-1.35	0.02-0.06	0.12-0.16	7.0-12.0	2.0-3.0	.32	.32	5	4	86
	7-22	0-20	50-60	1.30-1.40	0.01-0.04	0.10-0.12	9.0-15.0	0.0-1.0	.28	.28			
	22-60	5-50	12-18	1.40-1.50	2-4	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
5815:													
Onawa, occasionally flooded------------	0-7	0-20	38-40	1.30-1.35	0.06-0.2	0.17-0.20	6.0-8.0	2.0-3.0	.32	.32	5	4	86
	7-22	0-20	50-60	1.30-1.40	0.01-0.04	0.10-0.12	9.0-15.0	0.0-1.0	.28	.28			
	22-60	5-50	12-18	1.40-1.50	2-4	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
6075:													
Percival, occasionally flooded------------	0-8	0-20	40-60	1.30-1.35	0.01-0.06	0.10-0.14	7.0-15.0	1.0-3.0	.28	.28	4	4	86
	8-24	0-20	40-60	1.30-1.35	0.01-0.06	0.10-0.12	7.0-15.0	0.0-2.0	.28	.28			
	24-60	70-100	2-12	1.30-1.50	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
6133:													
Platte, occasionally flooded------------	0-5	25-80	10-20	1.23-1.45	2-6	0.20-0.24	0.0-2.9	1.0-3.0	.28	.28	3	4L	86
	5-8	52-80	10-20	1.23-1.45	2-6	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	8-16	52-80	7-18	1.45-1.70	2-13	0.17-0.19	0.0-2.9	0.0-0.5	.28	.28			
	16-80	85-100	0-3	1.65-1.85	20-100	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
6164:													
Pohocco, eroded-----	0-6	2-10	27-35	1.35-1.40	0.2-0.6	0.21-0.23	3.0-5.9	0.5-2.0	.37	.37	5	6	48
	6-15	2-12	20-35	1.35-1.45	0.2-2	0.18-0.22	1.0-5.9	0.5-1.0	.43	.43			
	15-28	2-12	20-35	1.35-1.45	0.2-2	0.18-0.20	1.0-5.9	0.5-1.0	.43	.43			
	28-80	2-12	20-27	1.35-1.40	0.6-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			
Monona, eroded------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			
6178:													
Pohocco, eroded-----	0-6	2-10	27-35	1.35-1.40	0.2-0.6	0.21-0.23	3.0-5.9	0.5-2.0	.37	.37	5	6	48
	6-15	2-12	20-35	1.35-1.45	0.2-2	0.18-0.22	1.0-5.9	0.5-1.0	.43	.43			
	15-28	2-12	20-35	1.35-1.45	0.2-2	0.18-0.20	1.0-5.9	0.5-1.0	.43	.43			
	28-80	2-12	20-27	1.35-1.40	0.6-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			
Ida, eroded---------	0-6	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	1.0-2.0	.32	.32	4	4L	86
	6-12	2-10	18-25	1.20-1.30	0.9-2	0.20-0.22	1.0-2.9	0.5-1.5	.43	.43			
	12-80	2-10	18-25	1.20-1.30	0.9-2	0.18-0.22	1.0-2.9	0.0-0.5	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
6490:													
Salix, rarely flooded-----------	0-15	0-20	27-30	1.25-1.30	0.4-0.6	0.21-0.23	3.0-4.5	3.0-4.0	.28	.28	5	4	86
	15-25	0-20	28-38	1.30-1.35	0.2-0.6	0.18-0.20	4.0-7.0	1.0-2.0	.43	.43			
	25-33	5-25	16-22	1.30-1.35	1-4	0.18-0.20	0.0-2.9	1.0-2.0	.43	.43			
	33-60	5-25	16-22	1.35-1.45	1-4	0.18-0.20	0.0-2.9	0.0-1.0	.43	.43			
6660:													
Sarpy, occasionally flooded-----------	0-6	85-100	2-5	1.20-1.50	6-20	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	6-60	70-100	2-5	1.20-1.50	6-20	0.05-0.09	0.0-2.9	0.0-0.5	.15	.15			
6670:													
Sarpy, occasionally flooded-----------	0-6	70-100	2-5	1.20-1.50	6-20	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	6-60	70-100	2-5	1.20-1.50	6-20	0.05-0.09	0.0-2.9	0.0-0.5	.15	.15			
6906:													
Shell, occasionally flooded-----------	0-24	5-25	15-27	1.20-1.30	0.6-4	0.20-0.23	0.0-3.5	2.0-4.0	.32	.32	5	6	48
	24-33	5-25	20-30	1.20-1.30	0.4-2	0.18-0.20	1.0-4.0	0.5-1.0	.43	.43			
	33-60	5-25	20-30	1.20-1.30	0.4-2	0.18-0.20	1.0-4.0	0.0-0.5	.43	.43			
8166:													
Zook, occasionally flooded-----------	0-20	0-20	35-40	1.30-1.35	0.06-0.2	0.17-0.20	6.0-8.0	2.0-7.0	.37	.37	5	4	86
	20-52	0-20	36-45	1.30-1.45	0.05-0.2	0.11-0.16	6.0-8.9	1.0-4.0	.28	.28			
	52-60	0-20	20-45	1.30-1.45	0.05-2	0.11-0.22	6.0-8.9	0.5-1.0	.28	.28			
8503:													
Monona--------------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			
8504:													
Monona--------------	0-7	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	2.2-3.2	.28	.28	5	6	48
	7-15	2-10	20-27	1.25-1.30	0.6-2	0.22-0.24	1.0-4.0	0.8-2.5	.28	.28			
	15-30	2-10	22-28	1.30-1.35	0.6-1	0.18-0.20	1.0-4.0	0.5-1.2	.43	.43			
	30-60	2-10	18-24	1.35-1.40	0.9-2	0.18-0.20	1.0-2.9	0.2-0.3	.43	.43			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
8505:													
Fontanelle, depressional, frequently flooded	0-7	5-20	27-40	1.05-1.35	0.06-0.6	0.21-0.23	3.0-7.0	2.0-4.0	.32	.32	4	4	86
	7-13	5-20	20-35	1.25-1.45	0.2-2	0.21-0.23	1.0-6.0	2.0-4.0	.43	.43			
	13-22	5-50	10-25	1.40-1.65	0.9-6	0.17-0.20	0.0-3.0	0.5-1.0	.43	.43			
	22-41	45-100	2-30	1.40-1.65	0.6-6	0.16-0.20	0.0-3.5	0.5-1.0	.43	.43			
	41-48	5-85	15-25	1.40-1.65	0.9-4	0.16-0.20	0.0-3.0	0.5-1.0	.43	.43			
	48-60	5-20	20-40	1.25-1.45	0.06-1	0.18-0.20	3.0-7.0	2.0-4.0	.32	.32			
	60-80	5-50	20-32	1.45-1.65	0.4-2	0.17-0.20	1.0-4.5	0.5-1.0	.43	.43			
8507:													
Onawet, depressional, frequently flooded	0-7	5-50	40-65	1.20-1.30	0.01-0.06	0.10-0.12	7.0-15.0	2.0-3.0	.32	.32	5	4	86
	7-24	0-30	40-65	1.30-1.40	0.01-0.06	0.10-0.12	7.0-15.0	1.0-2.0	.32	.32			
	24-39	15-85	7-18	1.40-1.50	2-13	0.16-0.18	0.0-3.0	0.5-2.0	.43	.43			
	39-56	15-85	7-27	1.40-1.50	0.6-13	0.18-0.20	0.0-3.0	0.5-2.0	.43	.43			
	56-80	70-100	0-15	1.45-1.55	3-20	0.08-0.10	0.0-3.0	0.0-0.2	.17	.17			
8508:													
Onawa, occasionally flooded------------	0-7	0-20	40-55	1.30-1.35	0.02-0.06	0.12-0.16	7.0-12.0	2.0-3.0	.32	.32	5	4	86
	7-22	0-20	50-60	1.30-1.40	0.01-0.04	0.10-0.12	9.0-15.0	0.0-1.0	.28	.28			
	22-60	5-50	12-18	1.40-1.50	2-4	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
Haynie, occasionally flooded------------	0-7	5-50	15-25	1.20-1.35	0.9-4	0.20-0.23	0.0-2.9	1.0-3.0	.32	.32	5	4L	86
	7-60	5-50	15-18	1.20-1.35	2-4	0.18-0.20	0.0-2.9	0.0-1.0	.43	.43			
8510:													
Wathena, occasionally flooded------------	0-6	45-85	0-18	1.30-1.50	2-20	0.16-0.18	0.0-2.9	0.5-1.0	.17	.17	5	3	86
	6-14	70-100	0-15	1.35-1.55	3-20	0.10-0.12	0.0-2.9	0.5-1.0	.15	.15			
	14-21	85-100	0-10	1.40-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.37	.37			
	21-36	25-100	2-27	1.20-1.45	0.6-13	0.18-0.20	1.0-4.0	0.0-0.5	.37	.37			
	36-58	85-100	0-10	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.37	.37			
	58-69	45-100	5-18	1.20-1.40	2-13	0.16-0.18	0.0-2.9	0.0-0.0	.15	.15			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct					
8511:													
Wathena, rarely flooded-----------	0-6	45-85	0-18	1.30-1.50	2-20	0.16-0.18	0.0-2.9	0.5-1.0	.17	.17	5	3	86
	6-14	70-100	0-15	1.35-1.55	3-20	0.10-0.12	0.0-2.9	0.5-1.0	.15	.15			
	14-21	85-100	0-10	1.40-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.37	.37			
	21-36	25-100	2-27	1.20-1.45	0.6-13	0.18-0.20	1.0-4.0	0.0-0.5	.37	.37			
	36-58	85-100	0-10	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.37	.37			
	58-69	45-100	5-18	1.20-1.40	2-13	0.16-0.18	0.0-2.9	0.0-0.0	.15	.15			
8512:													
Gullied land--------	0-6	2-10	18-27	1.20-1.45	0.6-2	0.20-0.22	0.0-4.0	0.5-1.0	.43	.43	4	4L	86
	6-60	2-10	18-27	1.40-1.65	0.6-2	0.18-0.20	0.0-4.0	0.0-0.5	.43	.43			
Napier--------------	0-29	2-10	20-27	1.20-1.25	0.6-2	0.22-0.24	1.0-4.0	2.5-4.0	.28	.28	5	6	48
	29-48	2-10	20-27	1.25-1.30	0.6-2	0.18-0.20	1.0-4.0	1.5-2.5	.43	.43			
	48-65	2-10	20-27	1.25-1.30	0.6-2	0.18-0.20	1.0-4.0	0.8-2.0	.43	.43			
9900. Arents, earthen dams													
9980. Mine or Quarry													
9990. Aquolls													
9995. Miscellaneous water													
9998. Water													

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
1074:						
Albaton, occasionally flooded	0-7	32-48	7.4-8.4	5-30	0	0
	7-47	28-58	7.4-8.4	5-30	0	0
	47-65	24-30	7.4-8.4	5-30	0	0
	65-80	3.5-13	7.4-8.4	5-15	0	0
1075:						
Albaton, depressional, frequently flooded	0-7	32-48	7.4-8.4	5-30	0	0
	7-60	35-44	7.4-8.4	5-30	0	0
1090:						
Alcester	0-15	19-26	5.6-7.8	0	0	0.0-2.0
	15-34	17-27	6.1-7.8	0	0	0.0-2.0
	34-50	16-26	6.6-8.4	0-10	0	0.0-2.0
	50-60	14-24	7.4-8.4	0-10	0	0.0-2.0
1432:						
Belfore	0-14	23-35	5.6-7.3	0	0	0
	14-25	26-32	5.6-7.3	0	0	0
	25-48	19-27	6.1-7.8	0	0	0
	48-60	18-26	6.1-7.8	0-5	0	0
1436:						
Belfore	0-14	23-35	5.6-7.3	0	0	0
	14-25	26-32	5.6-7.3	0	0	0
	25-48	19-27	6.1-7.8	0	0	0
	48-60	18-26	6.1-7.8	0-5	0	0
1594:						
Blyburg, rarely flooded	0-11	21-31	6.6-8.4	0-5	0	0
	11-15	9.0-18	6.6-8.4	0-5	0	0
	15-60	7.0-14	7.9-8.4	0-5	0	0
1859:						
Burchard, eroded	0-11	23-29	5.6-7.3	0	0	0
	11-42	20-27	6.1-7.3	0	0	0
	42-78	18-23	7.4-8.4	5-10	0	0
	78-93	17-22	7.4-8.4	1-15	0-2	0
1879:						
Burchard, eroded	0-11	23-29	5.6-7.3	0	0	0
	11-42	20-27	6.1-7.3	0	0	0
	42-78	18-23	7.4-8.4	5-10	0	0
	78-93	17-22	7.4-8.4	1-15	0-2	0
Steinauer, eroded	0-6	20-26	7.4-8.4	5-10	0	0
	6-15	20-24	7.9-8.4	5-15	0	0
	15-60	17-26	7.9-8.4	5-15	0	0
2030:						
Cass, occasionally flooded	0-12	6.0-13	5.6-7.3	0	0	0
	12-47	4.0-9.5	6.1-8.4	0	0	0
	47-60	1.0-6.0	6.1-8.4	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
2041:						
Cass, occasionally flooded-------------	0-12	9.0-20	5.6-7.3	0	0	0
	12-47	4.0-9.5	6.1-8.4	0	0	0
	47-60	1.0-6.0	6.1-8.4	0	0	0
2192:						
Cooper, rarely flooded-------------	0-16	25-32	6.1-7.8	0-15	0	0
	16-24	21-28	6.6-8.4	0-25	0	0
	24-33	31-47	6.6-8.4	0-25	0	0
	33-60	28-44	6.6-8.4	0-25	0	0
2320:						
Crofton, eroded------	0-6	11-18	7.4-8.4	1-10	0	0
	6-12	11-16	7.4-8.4	1-15	0	0
	12-80	8.0-15	7.4-8.4	1-15	0	0
2322:						
Crofton, eroded------	0-6	11-18	7.4-8.4	1-10	0	0
	6-12	11-16	7.4-8.4	1-15	0	0
	12-80	8.0-15	7.4-8.4	1-15	0	0
2855:						
Fluvaquents, sandy, frequently flooded--	0-5	5.0-25	6.6-7.8	0-5	0	0.0-2.0
	5-60	1.0-13	6.6-7.8	0-5	0	0.0-2.0
	60-80	1.0-9.0	6.6-8.4	5-10	0	0
2863:						
Fluvaquents, silty, frequently flooded--	0-5	13-28	6.6-7.8	0-5	0	0.0-2.0
	5-60	3.0-22	6.6-7.8	0-5	0	0.0-2.0
	60-80	3.0-22	7.4-8.4	5-10	0	0.0-2.0
2890:						
Forney, rarely flooded-------------	0-8	19-27	6.1-8.4	0-25	0	0
	8-15	14-25	6.1-8.4	0-25	0	0
	15-19	28-48	6.1-7.8	0-15	0	0
	19-29	39-48	6.1-7.8	0-15	0	0
	29-45	37-48	6.1-7.8	0-15	0	0
	45-60	35-44	6.1-7.8	0-15	0	0
3150:						
Grable, occasionally flooded-------------	0-6	15-25	7.2-8.4	5-30	0	0
	6-23	8.0-13	7.2-8.4	5-30	0	0
	23-60	1.0-6.0	7.2-8.4	5-30	0	0
3410:						
Haynie, occasionally flooded-------------	0-7	13-24	6.6-8.4	0-25	0	0
	7-60	11-15	7.4-8.4	5-30	0	0
3812:						
Ida, eroded----------	0-6	15-22	6.6-8.4	0-25	0	0
	6-12	14-21	7.4-8.4	5-30	0	0
	12-80	13-19	7.4-8.4	5-30	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
3822:						
Ida, eroded----------	0-6	15-22	6.6-8.4	0-25	0	0
	6-12	14-21	7.4-8.4	5-30	0	0
	12-80	13-19	7.4-8.4	5-30	0	0
3892:						
Inglewood, rarely flooded-------------	0-5	2.0-7.0	6.1-7.8	0	0	0
	5-40	1.0-5.0	6.1-7.8	0	0	0
	40-50	0.0-4.0	6.1-7.8	0	0	0
	50-80	0.0-4.0	6.1-7.8	0	0	0
4112:						
Judson---------------	0-30	24-29	5.6-7.3	0	0	0
	30-38	21-26	5.6-7.3	0	0	0
	38-60	22-27	5.6-7.3	0	0	0
	60-75	22-27	5.6-7.3	0	0	0
4230:						
Kennebec, occasionally flooded	0-18	19-28	5.6-7.3	0	0	0
	18-41	19-24	5.6-7.3	0	0	0
	41-60	18-24	6.1-7.3	0	0	0
4287:						
Kezan, occasionally flooded-------------	0-6	18-27	6.6-7.8	0	0	0
	6-13	18-27	6.6-7.8	0	0	0
	13-32	18-27	6.6-8.4	0-10	0	0
	32-60	19-31	6.6-8.4	0-10	0	0
4288:						
Kezan, occasionally flooded-------------	0-6	18-27	6.6-7.8	0	0	0
	6-13	18-27	6.6-7.8	0	0	0
	13-32	18-27	6.6-8.4	0-10	0	0
	32-60	19-31	6.6-8.4	0-10	0	0
Kennebec, occasionally flooded	0-18	19-28	5.6-7.3	0	0	0
	18-41	19-24	5.6-7.3	0	0	0
	41-60	18-24	6.1-7.3	0	0	0
4780:						
Luton, rarely flooded	0-12	31-52	6.6-7.8	0-15	0	0
	12-24	30-46	6.6-8.4	0-15	0	0
	24-33	30-46	6.6-8.4	0-15	1-5	0
	33-43	28-44	6.6-7.8	0-15	1-5	0
	43-50	28-44	7.4-8.4	0-15	1-5	0
	50-60	28-44	6.6-7.8	0-15	0-3	0
4956:						
Marshall-------------	0-7	24-32	5.6-7.3	0	0	0
	7-18	21-29	5.6-7.3	0	0	0
	18-47	19-28	5.6-7.3	0	0	0
	47-68	16-22	6.6-7.3	0	0	0
4961:						
Marshall-------------	0-7	24-32	5.6-7.3	0	0	0
	7-18	21-29	5.6-7.3	0	0	0
	18-47	19-28	5.6-7.3	0	0	0
	47-68	16-22	6.6-7.3	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
4974:						
Marshall, eroded	0-7	24-32	5.6-7.3	0	0	0
	7-18	21-29	5.6-7.3	0	0	0
	18-47	19-28	5.6-7.3	0	0	0
	47-68	16-22	6.6-7.3	0	0	0
Pohocco, eroded	0-6	20-29	6.6-7.8	0	0	0
	6-15	15-27	6.6-7.8	0	0	0
	15-28	15-27	6.6-7.8	1-5	0	0
	28-80	14-20	7.4-8.4	1-10	0	0
5321:						
Monona	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
5343:						
Monona, eroded	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
Ida, eroded	0-6	15-22	6.6-8.4	0-25	0	0
	6-12	14-21	7.4-8.4	5-30	0	0
	12-80	13-19	7.4-8.4	5-30	0	0
5348:						
Monona, eroded	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
Pohocco, eroded	0-6	20-29	6.6-7.8	0	0	0
	6-15	15-27	6.6-7.8	0	0	0
	15-28	15-27	6.6-7.8	1-5	0	0
	28-80	14-20	7.4-8.4	1-10	0	0
5358:						
Moody	0-17	23-33	5.6-7.3	0	0	0
	17-62	18-27	5.6-7.3	0	0	0
	62-70	15-23	7.4-8.4	3-15	0-2	0
	70-98	13-19	7.4-8.4	3-15	0-2	0
5415:						
Moville, rarely flooded	0-6	9.0-19	7.2-7.9	0-5	0	0
	6-27	8.0-15	7.4-8.4	0-10	0	0
	27-45	41-50	6.6-7.8	0-5	0	0
	45-60	37-46	6.6-7.8	0-10	0	0
5493:						
Napier	0-29	19-27	6.1-7.3	0	0	0
	29-48	17-24	6.1-8.4	0-10	0	0
	48-65	16-23	6.1-8.4	0-10	0	0
Nodaway, occasionally flooded	0-7	17-25	6.1-7.3	0	0	0.0-2.0
	7-60	13-22	6.1-7.3	0	0	0.0-2.0
Gullied land	0-6	10-20	6.6-8.4	0-10	0	0
	6-60	10-20	7.4-8.4	5-15	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
5575:						
Nora, eroded	0-9	23-33	6.1-7.3	0	0	0.0-2.0
	9-22	15-27	6.1-7.8	0-5	0	0.0-2.0
	22-54	13-23	6.6-8.4	5-15	0	0.0-2.0
	54-80	13-22	6.6-8.4	5-15	0	0.0-2.0
5583:						
Nora, eroded	0-9	23-33	6.1-7.3	0	0	0.0-2.0
	9-22	15-27	6.1-7.8	0-5	0	0.0-2.0
	22-54	13-23	6.6-8.4	5-15	0	0.0-2.0
	54-80	13-22	6.6-8.4	5-15	0	0.0-2.0
Crofton, eroded	0-6	11-18	7.4-8.4	1-10	0	0
	6-12	11-16	7.4-8.4	1-15	0	0
	12-80	8.0-15	7.4-8.4	1-15	0	0
5800:						
Omadi, rarely flooded	0-12	10-23	6.6-8.4	0-10	0	0.0-2.0
	12-20	9.0-21	7.4-8.4	0-10	0	0.0-2.0
	20-80	14-23	7.4-8.4	1-10	0	0.0-2.0
5814:						
Onawa, occasionally flooded	0-7	32-45	7.4-8.4	5-30	0	0
	7-22	35-44	7.4-8.4	5-30	0	0
	22-60	8.0-14	7.4-8.4	5-30	0	0
5815:						
Onawa, occasionally flooded	0-7	29-34	7.4-8.4	5-30	0	0
	7-22	35-44	7.4-8.4	5-30	0	0
	22-60	8.0-14	7.4-8.4	5-30	0	0
6075:						
Percival, occasionally flooded	0-8	36-41	6.6-8.4	0-15	0	0
	8-24	35-40	6.6-8.4	0-25	0	0
	24-60	5.0-15	7.4-8.4	0-25	0	0
6133:						
Platte, occasionally flooded	0-5	7.0-16	6.6-8.4	0-10	0	0.0-2.0
	5-8	7.0-16	6.6-8.4	0-10	0	0.0-2.0
	8-16	4.0-10	6.6-8.4	0-10	0	0.0-2.0
	16-80	0.0-3.0	6.6-8.4	0-5	0	0.0-2.0
6164:						
Pohocco, eroded	0-6	20-29	6.6-7.8	0	0	0
	6-15	15-27	6.6-7.8	0	0	0
	15-28	15-27	6.6-7.8	1-5	0	0
	28-80	14-20	7.4-8.4	1-10	0	0
Monona, eroded	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
6178:						
Pohocco, eroded	0-6	20-29	6.6-7.8	0	0	0
	6-15	15-27	6.6-7.8	0	0	0
	15-28	15-27	6.6-7.8	1-5	0	0
	28-80	14-20	7.4-8.4	1-10	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
6178:						
Ida, eroded	0-6	15-22	6.6-8.4	0-25	0	0
	6-12	14-21	7.4-8.4	5-30	0	0
	12-80	13-19	7.4-8.4	5-30	0	0
6490:						
Salix, rarely flooded	0-15	25-29	6.1-7.8	0-15	0	0
	15-25	22-31	6.1-7.8	0-15	0	0
	25-33	13-19	6.1-7.8	0-15	0	0
	33-60	11-17	6.6-8.4	0-30	0	0
6660:						
Sarpy, occasionally flooded	0-6	2.0-5.0	6.6-8.4	0-15	0	0
	6-60	1.0-4.0	6.6-8.4	0-15	0	0
6670:						
Sarpy, occasionally flooded	0-6	2.0-5.0	6.6-8.4	0-15	0	0
	6-60	2.0-8.0	6.6-8.4	0-15	0	0
6906:						
Shell, occasionally flooded	0-24	15-27	5.6-7.3	0	0	0
	24-33	15-23	5.6-7.3	0	0	0
	33-60	14-22	6.1-7.8	0-5	0	0
8166:						
Zook, occasionally flooded	0-20	29-42	5.6-7.3	0	0	0
	20-52	27-40	5.6-7.8	0	0	0
	52-60	15-34	5.6-7.8	0	0	0
8503:						
Monona	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
8504:						
Monona	0-7	19-25	5.6-7.3	0	0	0
	7-15	16-24	5.6-7.3	0	0	0
	15-30	16-22	6.1-7.3	0	0	0
	30-60	13-18	6.6-8.4	0-25	0	0
8505:						
Fontanelle, depressional, frequently flooded	0-7	23-36	6.6-7.8	0-5	0	0
	7-13	18-33	6.6-7.8	0-5	0	0
	13-22	8.0-20	6.6-7.8	0-5	0	0
	22-41	6.0-16	6.6-8.4	0-5	0	0
	41-48	12-20	6.6-8.4	0-5	0	0
	48-60	18-36	6.6-8.4	0-5	0	0
	60-80	15-24	6.6-8.4	0-5	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity
	In	meq/100 g	pH	Pct	Pct	mmhos/cm
8507:						
Onawet, depressional, frequently flooded--	0-7	30-52	6.6-7.8	0-20	0	0
	7-24	30-50	7.4-8.4	5-25	0	0
	24-39	6.0-17	7.4-8.4	5-25	0	0
	39-56	6.0-23	7.4-8.4	5-25	0	0
	56-80	0.0-11	7.4-8.4	5-20	0	0
8508:						
Onawa, occasionally flooded-------------	0-7	32-45	7.4-8.4	5-30	0	0
	7-22	35-44	7.4-8.4	5-30	0	0
	22-60	8.0-14	7.4-8.4	5-30	0	0
Haynie, occasionally flooded-------------	0-7	13-24	6.6-8.4	0-25	0	0
	7-60	11-15	7.4-8.4	5-30	0	0
8510:						
Wathena, occasionally flooded-------------	0-6	1.0-11	6.6-8.4	1-2	0	0
	6-14	1.0-10	6.6-8.4	1-2	0	0
	14-21	0.0-6.0	6.6-8.4	5-15	0	0
	21-36	3.0-15	7.4-8.4	5-15	0	0
	36-58	0.0-5.0	6.6-8.4	5-15	0	0
	58-69	3.0-9.0	7.4-8.4	5-15	0	0
8511:						
Wathena, rarely flooded-------------	0-6	1.0-11	6.6-8.4	1-2	0	0
	6-14	1.0-10	6.6-8.4	1-2	0	0
	14-21	0.0-6.0	6.6-8.4	5-15	0	0
	21-36	3.0-15	7.4-8.4	5-15	0	0
	36-58	0.0-5.0	6.6-8.4	5-15	0	0
	58-69	3.0-9.0	7.4-8.4	5-15	0	0
8512:						
Gullied land---------	0-6	10-20	6.6-8.4	0-10	0	0
	6-60	10-20	7.4-8.4	5-15	0	0
Napier---------------	0-29	19-27	6.1-7.3	0	0	0
	29-48	17-24	6.1-8.4	0-10	0	0
	48-65	16-23	6.1-8.4	0-10	0	0
9900.						
Arents, earthen dams						
9980.						
Mine or Quarry						
9990.						
Aquolls						
9995.						
Miscellaneous water						
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	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
1074:			
Albaton, occasionally flooded	Moderate	High	Low
1075:			
Albaton, depressional, frequently flooded	High	High	Low
1090:			
Alcester	High	Moderate	Low
1432:			
Belfore	Moderate	High	Low
1436:			
Belfore	Moderate	High	Low
1594:			
Blyburg, rarely flooded	High	Low	Low
1859:			
Burchard, eroded	Moderate	Moderate	Low
1879:			
Burchard, eroded	Moderate	Moderate	Low
Steinauer, eroded	Moderate	High	Low
2030:			
Cass, occasionally flooded	Moderate	Moderate	Low
2041:			
Cass, occasionally flooded	Moderate	Moderate	Low
2192:			
Cooper, rarely flooded	High	High	Low
2320:			
Crofton, eroded	Moderate	Low	Low
2322:			
Crofton, eroded	Moderate	Low	Low
2855:			
Fluvaquents, sandy, frequently flooded	Moderate	High	Low
2863:			
Fluvaquents, silty, frequently flooded	Moderate	High	Low
2890:			
Forney, rarely flooded	Moderate	High	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
3150:			
Grable, occasionally flooded	Low	Low	Low
3410:			
Haynie, occasionally flooded	High	Low	Low
3812:			
Ida, eroded	High	Low	Low
3822:			
Ida, eroded	High	Low	Low
3892:			
Inglewood, rarely flooded	Moderate	Moderate	Low
4112:			
Judson	High	Moderate	Low
4230:			
Kennebec, occasionally flooded	High	Moderate	Low
4287:			
Kezan, occasionally flooded	High	High	Low
4288:			
Kezan, occasionally flooded	High	High	Low
Kennebec, occasionally flooded	High	Moderate	Low
4780:			
Luton, rarely flooded	Moderate	High	Low
4956:			
Marshall	High	Moderate	Moderate
4961:			
Marshall	High	Moderate	Moderate
4974:			
Marshall, eroded	High	Moderate	Moderate
Pohocco, eroded	High	Moderate	Low
5321:			
Monona	High	Low	Low
5343:			
Monona, eroded	High	Low	Low
Ida, eroded	High	Low	Low
5348:			
Monona, eroded	High	Low	Low
Pohocco, eroded	High	Moderate	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
5358:			
Moody	High	Moderate	Low
5415:			
Moville, rarely flooded	High	High	Low
5493:			
Napier	High	Low	Low
Nodaway, occasionally flooded	High	Moderate	Low
Gullied land	High	Low	Low
5575:			
Nora, eroded	High	Moderate	Low
5583:			
Nora, eroded	High	Moderate	Low
Crofton, eroded	Moderate	Low	Low
5800:			
Omadi, rarely flooded	High	Low	Low
5814:			
Onawa, occasionally flooded	High	High	Low
5815:			
Onawa, occasionally flooded	High	High	Low
6075:			
Percival, occasionally flooded	Moderate	High	Low
6133:			
Platte, occasionally flooded	Moderate	High	Moderate
6164:			
Pohocco, eroded	High	Moderate	Low
Monona, eroded	High	Low	Low
6178:			
Pohocco, eroded	High	Moderate	Low
Ida, eroded	High	Low	Low
6490:			
Salix, rarely flooded	High	Moderate	Low
6660:			
Sarpy, occasionally flooded	Low	Low	Low
6670:			
Sarpy, occasionally flooded	Low	Low	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
6906:			
Shell, occasionally flooded	Moderate	Low	Low
8166:			
Zook, occasionally flooded	High	High	Moderate
8503:			
Monona	High	Low	Low
8504:			
Monona	High	Low	Low
8505:			
Fontanelle, depressional, frequently flooded	High	High	Low
8507:			
Onawet, depressional, frequently flooded	High	High	Low
8508:			
Onawa, occasionally flooded	High	High	Low
Haynie, occasionally flooded	High	Low	Low
8510:			
Wathena, occasionally flooded	Low	Low	Low
8511:			
Wathena, rarely flooded	Low	Low	Low
8512:			
Gullied land	High	Low	Low
Napier	High	Low	Low
9900.			
Arents, earthen dams			
9980.			
Mine or Quarry			
9990.			
Aquolls			
9995.			
Miscellaneous water			
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	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
1074:									
Albaton, occasionally flooded------------------	D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		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	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Rare
		October	---	---	---	---	None	Brief	Rare
		November	0.0-1.5	>6.0	---	---	None	Brief	Rare
		December	0.0-1.5	>6.0	---	---	None	---	None
1075:									
Albaton, depressional, frequently flooded-------	D								
		January	0.0-1.0	1.0-2.0	0.0-1.0	Long	Occasional	Brief	Frequent
		February	0.0-1.0	1.0-2.0	0.0-1.0	Long	Occasional	Brief	Frequent
		March	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		April	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		May	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		June	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		November	0.0-1.0	1.0-2.0	0.0-1.0	Long	Occasional	Brief	Frequent
		December	0.0-1.0	1.0-2.0	0.0-1.0	Long	Occasional	Brief	Frequent
1090:									
Alcester------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
1432:									
Belfore-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
1436:									
Belfore-------------------	C								
		Jan-Dec	---	---	---	---	None	---	None
1594:									
Blyburg, rarely flooded---	B								
		April	---	---	---	---	None	Brief	Rare
		May	---	---	---	---	None	Brief	Rare
		June	---	---	---	---	None	Brief	Rare
		July	---	---	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
1859:									
Burchard, eroded----------	B								
		Jan-Dec	---	---	---	---	None	---	None
1879:									
Burchard, eroded----------	B								
		Jan-Dec	---	---	---	---	None	---	None
Steinauer, eroded---------	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
2030:									
Cass, occasionally flooded	B								
		March	---	---	---	---	None	Brief	Occasional
		April	---	---	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
2041:									
Cass, occasionally flooded	B								
		March	---	---	---	---	None	Brief	Occasional
		April	---	---	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
2192:									
Cooper, rarely flooded----	C								
		January	1.5-2.5	>6.0	---	---	None	---	None
		February	1.5-2.5	>6.0	---	---	None	---	None
		March	1.5-2.5	>6.0	---	---	None	Brief	Rare
		April	1.5-2.5	>6.0	---	---	None	Brief	Rare
		May	1.5-2.5	>6.0	---	---	None	Brief	Rare
		June	1.5-2.5	>6.0	---	---	None	Brief	Rare
		July	1.5-2.5	>6.0	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		November	1.5-2.5	>6.0	---	---	None	---	None
		December	1.5-2.5	>6.0	---	---	None	---	None
2320:									
Crofton, eroded-----------	B								
		Jan-Dec	---	---	---	---	None	---	None
2322:									
Crofton, eroded-----------	B								
		Jan-Dec	---	---	---	---	None	---	None
2855:									
Fluvaquents, sandy, frequently flooded-------	D								
		January	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional
		February	0.0-1.0	>6.0	0.0-1.0	---	None	Long	Occasional
		March	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		April	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		May	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		June	0.0-1.0	>6.0	0.0-1.0	---	None	Long	Frequent
		July	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		August	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		September	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		October	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		November	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional
		December	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
2863: Fluvaquents, silty, frequently flooded	D								
		January	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional
		February	0.0-1.0	>6.0	0.0-1.0	---	None	Long	Occasional
		March	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		April	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		May	0.0-1.0	>6.0	0.0-1.0	---	None	Very long	Frequent
		June	0.0-1.0	>6.0	0.0-1.0	---	None	Long	Frequent
		July	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		August	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		September	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		October	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Rare
		November	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional
		December	0.0-1.0	>6.0	0.0-1.0	---	None	Brief	Occasional
2890: Forney, rarely flooded	D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	Brief	Rare
		March	0.0-1.5	>6.0	---	---	None	Brief	Rare
		April	0.0-1.5	>6.0	---	---	None	Brief	Rare
		May	0.0-1.5	>6.0	---	---	None	Brief	Rare
		June	0.0-1.5	>6.0	---	---	None	Brief	Rare
		July	0.0-1.5	>6.0	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		September	---	---	---	---	None	Brief	Rare
		October	---	---	---	---	None	Brief	Rare
		November	0.0-1.5	>6.0	---	---	None	Brief	Rare
		December	0.0-1.5	>6.0	---	---	None	---	None
3150: Grable, occasionally flooded	B								
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
3410: Haynie, occasionally flooded	B								
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
3812:									
Ida, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
3822:									
Ida, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
3892:									
Inglewood, rarely flooded	A								
		January	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		February	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		March	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		April	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		May	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		June	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		July	3.0-6.0	>6.0	---	---	None	Very brief	Occasional
		November	3.0-6.0	>6.0	---	---	None	---	None
		December	3.0-6.0	>6.0	---	---	None	---	None
4112:									
Judson	B								
		Jan-Dec	---	---	---	---	None	---	None
4230:									
Kennebec, occasionally flooded	B								
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		March	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		April	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		June	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		July	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		December	3.0-6.0	>6.0	---	---	None	---	None
4287:									
Kezan, occasionally flooded	B/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

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
4288:									
Kezan, occasionally flooded	B/D								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	---	None
		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
		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	1.5-3.0	>6.0	---	---	None	---	None
		December	1.5-3.0	>6.0	---	---	None	---	None
Kennebec, occasionally flooded	B								
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		March	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		April	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		June	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		July	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		December	3.0-6.0	>6.0	---	---	None	---	None
4780:									
Luton, rarely flooded	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	Rare
		April	0.0-1.5	>6.0	---	---	None	Brief	Rare
		May	0.0-1.5	>6.0	---	---	None	Brief	Rare
		June	0.0-1.5	>6.0	---	---	None	Brief	Rare
		July	0.0-1.5	>6.0	---	---	None	---	None
		November	0.0-1.5	>6.0	---	---	None	---	None
		December	0.0-1.5	>6.0	---	---	None	---	None
4956:									
Marshall	B								
		Jan-Dec	---	---	---	---	None	---	None
4961:									
Marshall	B								
		Jan-Dec	---	---	---	---	None	---	None
4974:									
Marshall, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
Pohocco, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
5321:									
Monona	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
5343:									
Monona, eroded------------	B								
		Jan-Dec	---	---	---	---	None	---	None
Ida, eroded---------------	B								
		Jan-Dec	---	---	---	---	None	---	None
5348:									
Monona, eroded------------	B								
		Jan-Dec	---	---	---	---	None	---	None
Pohocco, eroded-----------	B								
		Jan-Dec	---	---	---	---	None	---	None
5358:									
Moody---------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
5415:									
Moville, rarely flooded---	C								
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	Brief	Rare
		March	3.0-6.0	>6.0	---	---	None	Brief	Rare
		April	3.0-6.0	>6.0	---	---	None	Brief	Rare
		May	3.0-6.0	>6.0	---	---	None	Brief	Rare
		June	3.0-6.0	>6.0	---	---	None	Brief	Rare
		July	3.0-6.0	>6.0	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		September	---	---	---	---	None	Brief	Rare
		October	---	---	---	---	None	Brief	Rare
		November	3.0-6.0	>6.0	---	---	None	Brief	Rare
		December	3.0-6.0	>6.0	---	---	None	---	None
5493:									
Napier--------------------	B								
		Jan-Dec	---	---	---	---	None	---	None
Nodaway, occasionally flooded------------------	B								
		February	---	---	---	---	None	Brief	Occasional
		March	---	---	---	---	None	Brief	Occasional
		April	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		June	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		July	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	---	---	---	---	None	Brief	Occasional
Gullied land--------------	B								
		Jan-Dec	---	---	---	---	None	---	None
5575:									
Nora, eroded--------------	B								
		Jan-Dec	---	---	---	---	None	---	None
5583:									
Nora, eroded--------------	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
5583:									
Crofton, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
5800:									
Omadi, rarely flooded	B								
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	---	None
		March	3.0-6.0	>6.0	---	---	None	---	None
		April	3.0-6.0	>6.0	---	---	None	Brief	Rare
		May	3.0-6.0	>6.0	---	---	None	Brief	Rare
		June	3.0-6.0	>6.0	---	---	None	Brief	Rare
		July	---	---	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		November	3.0-6.0	>6.0	---	---	None	---	None
		December	3.0-6.0	>6.0	---	---	None	---	None
5814:									
Onawa, occasionally flooded	D								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		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
		July	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	1.5-3.0	>6.0	---	---	None	---	None
5815:									
Onawa, occasionally flooded	D								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		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
		July	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	1.5-3.0	>6.0	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
6075:									
Percival, occasionally flooded	D								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		March	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		April	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		May	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		June	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		July	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Very brief	Occasional
		December	1.5-3.0	>6.0	---	---	None	---	None
6133:									
Platte, occasionally flooded	B								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		March	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		April	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	---	None
		December	1.5-3.0	>6.0	---	---	None	---	None
6164:									
Pohocco, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
Monona, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
6178:									
Pohocco, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
Ida, eroded	B								
		Jan-Dec	---	---	---	---	None	---	None
6490:									
Salix, rarely flooded	B								
		January	3.0-6.0	>6.0	---	---	None	---	None
		February	3.0-6.0	>6.0	---	---	None	---	None
		March	3.0-6.0	>6.0	---	---	None	Brief	Rare
		April	3.0-6.0	>6.0	---	---	None	Brief	Rare
		May	3.0-6.0	>6.0	---	---	None	Brief	Rare
		June	3.0-6.0	>6.0	---	---	None	Brief	Rare
		July	3.0-6.0	>6.0	---	---	None	Brief	Rare
		November	3.0-6.0	>6.0	---	---	None	---	None
		December	3.0-6.0	>6.0	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table Upper limit	Water table Lower limit	Ponding Surface water depth	Ponding Duration	Ponding Frequency	Flooding Duration	Flooding Frequency
			Ft	Ft	Ft				
6660: Sarpy, occasionally flooded	A								
		January	---	---	---	---	None	Brief	Occasional
		February	---	---	---	---	None	Brief	Occasional
		March	---	---	---	---	None	Long	Occasional
		April	---	---	---	---	None	Long	Occasional
		May	---	---	---	---	None	Long	Occasional
		June	---	---	---	---	None	Long	Occasional
		July	---	---	---	---	None	Very brief	Very rare
		August	---	---	---	---	None	Very brief	Very rare
		September	---	---	---	---	None	Very brief	Very rare
		October	---	---	---	---	None	Very brief	Very rare
		November	---	---	---	---	None	Brief	Occasional
		December	---	---	---	---	None	Brief	Occasional
6670: Sarpy, occasionally flooded	A								
		January	---	---	---	---	None	Brief	Occasional
		February	---	---	---	---	None	Brief	Occasional
		March	---	---	---	---	None	Long	Occasional
		April	---	---	---	---	None	Long	Occasional
		May	---	---	---	---	None	Long	Occasional
		June	---	---	---	---	None	Long	Occasional
		July	---	---	---	---	None	Very brief	Very rare
		August	---	---	---	---	None	Very brief	Very rare
		September	---	---	---	---	None	Very brief	Very rare
		October	---	---	---	---	None	Very brief	Very rare
		November	---	---	---	---	None	Brief	Occasional
		December	---	---	---	---	None	Brief	Occasional
6906: Shell, occasionally flooded	B								
		March	---	---	---	---	None	Brief	Occasional
		April	---	---	---	---	None	Brief	Occasional
		May	---	---	---	---	None	Brief	Occasional
		June	---	---	---	---	None	Brief	Occasional
8166: Zook, occasionally flooded	C/D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		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	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		December	0.0-1.5	>6.0	---	---	None	---	None
8503: Monona	B								
		Jan-Dec	---	---	---	---	None	---	None
8504: Monona	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
8505:									
Fontanelle, depressional, frequently flooded-------	D								
		January	0.0-1.0	1.0-2.0	0.0-1.0	Very brief	Occasional	Very brief	Occasional
		February	0.0-1.0	1.0-2.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		March	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		April	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		May	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		June	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		July	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		August	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Long	Frequent
		September	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Long	Frequent
		October	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Brief	Occasional
		November	0.0-1.0	1.0-2.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		December	0.0-1.0	1.0-2.0	0.0-1.0	Very brief	Occasional	Very brief	Occasional
8507:									
Onawet, depressional, frequently flooded-------	D								
		January	0.0-1.0	1.0-2.0	0.0-1.0	Very brief	Occasional	Very brief	Occasional
		February	0.0-1.0	1.0-2.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		March	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		April	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		May	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		June	0.0-1.0	1.0-2.0	0.5-2.0	Very long	Frequent	Long	Frequent
		July	0.0-1.0	1.0-2.0	0.5-2.0	Long	Frequent	Long	Frequent
		August	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Long	Frequent
		September	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Long	Frequent
		October	0.0-1.0	1.0-2.0	0.0-1.0	Long	Frequent	Brief	Occasional
		November	0.0-1.0	1.0-2.0	0.0-1.0	Brief	Occasional	Brief	Occasional
		December	0.0-1.0	1.0-2.0	0.0-1.0	Very brief	Occasional	Very brief	Occasional
8508:									
Onawa, occasionally flooded------------------	D								
		January	1.5-3.0	>6.0	---	---	None	---	None
		February	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		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
		July	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
		November	1.5-3.0	>6.0	---	---	None	Brief	Occasional
		December	1.5-3.0	>6.0	---	---	None	---	None
Haynie, occasionally flooded------------------	B								
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
8510:									
Wathena, occasionally flooded	B								
		January	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		February	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		March	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		April	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		May	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		June	3.0-6.0	>6.0	---	---	None	Brief	Occasional
		November	---	---	---	---	None	Brief	Occasional
		December	3.0-6.0	>6.0	---	---	None	Brief	Occasional
8511:									
Wathena, rarely flooded	B								
		January	3.0-6.0	>6.0	---	---	None	Brief	Rare
		February	3.0-6.0	>6.0	---	---	None	Brief	Rare
		March	3.0-6.0	>6.0	---	---	None	Brief	Rare
		April	3.0-6.0	>6.0	---	---	None	Brief	Rare
		May	3.0-6.0	>6.0	---	---	None	Brief	Rare
		June	3.0-6.0	>6.0	---	---	None	Brief	Rare
		November	---	---	---	---	None	Brief	Rare
		December	3.0-6.0	>6.0	---	---	None	Brief	Rare
8512:									
Gullied land	B								
		Jan-Dec	---	---	---	---	None	---	None
Napier	B								
		Jan-Dec	---	---	---	---	None	---	None
9900.									
Arents, earthen dams									
9980.									
Mine or Quarry									
9990:									
Aquolls	C								
		March	0.0	>6.0	0.0-0.8	Long	Frequent	---	None
		April	0.0	>6.0	0.0-0.8	Long	Frequent	---	None
		May	0.0	>6.0	0.0-0.8	Long	Frequent	---	None
		June	0.0	>6.0	0.0-0.8	Long	Frequent	---	None
9995.									
Miscellaneous water									
9998.									
Water									

Table 21.--Classification of the Soils

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

Soil name	Family or higher taxonomic class
Albaton	Very fine, smectitic, calcareous, mesic Vertic Fluvaquents
Alcester	Fine-silty, mixed, superactive, mesic Cumulic Haplustolls
Aquolls	Mesic Epiaquolls
Belfore	Fine, smectitic, mesic Udic Haplustolls
Blyburg	Coarse-silty, mixed, superactive, mesic Fluventic Hapludolls
Burchard	Fine-loamy, mixed, superactive, mesic Typic Argiudolls
Cass	Coarse-loamy, mixed, superactive, mesic Fluventic Haplustolls
Cooper	Fine-silty over clayey, mixed, superactive, mesic Fluvaquentic Hapludolls
Crofton	Fine-silty, mixed, superactive, calcareous, mesic Typic Ustorthents
Fluvaquents, sandy	Sandy, mixed, calcareous Fluvaquents
Fluvaquents, silty	Coarse-silty, mixed, calcareous Fluvaquents
Fontanelle	Coarse-silty, mixed, superactive, mesic Fluvaquentic Endoaquolls
Forney	Fine, smectitic, nonacid, mesic Vertic Fluvaquents
Grable	Coarse-silty over sandy or sandy-skeletal, mixed, superactive, calcareous, mesic Mollic Udifluvents
Gullied land	Typic Udorthents
Haynie	Coarse-silty, mixed, superactive, calcareous, mesic Mollic Udifluvents
Ida	Fine-silty, mixed, superactive, calcareous, mesic Typic Udorthents
Inglewood	Sandy, mixed, mesic Oxyaquic Udifluvents
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
*Luton	Very fine, smectitic, mesic Typic Endoaquerts
Marshall	Fine-silty, mixed, superactive, mesic Typic Hapludolls
Monona	Fine-silty, mixed, superactive, mesic Typic Hapludolls
Moody	Fine-silty, mixed, superactive, mesic Udic Haplustolls
Moville	Coarse-silty over clayey, mixed, superactive, calcareous, mesic Aquic Udifluvents
Napier	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Nodaway	Fine-silty, mixed, superactive, nonacid, mesic Mollic Udifluvents
Nora	Fine-silty, mixed, superactive, mesic Udic Haplustolls
Omadi	Fine-silty, mixed, superactive, mesic Fluventic Hapludolls
Onawa	Clayey over loamy, smectitic over mixed, superactive, calcareous, mesic Aquic Udifluvents
Onawet	Clayey over loamy, smectitic over mixed, calcareous, mesic Aeric Fluvaquents
Percival	Clayey over sandy or sandy-skeletal, smectitic, calcareous, mesic Aquic Udifluvents
Platte	Sandy, mixed, mesic Aeric Fluvaquents
Pohocco	Fine-silty, mixed, superactive, mesic Typic Eutrudepts
Salix	Fine-silty, mixed, superactive, mesic Typic Hapludolls
Sarpy	Mixed, mesic Typic Udipsamments
Shell	Fine-silty, mixed, superactive, mesic Cumulic Haplustolls
Steinauer	Fine-loamy, mixed, superactive, calcareous, mesic Typic Udorthents
Wathena	Sandy, mixed, mesic Mollic Udifluvents
Zook	Fine, smectitic, mesic Cumulic Vertic Endoaquolls

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Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by:

(1) mail: U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410;

(2) fax: (202) 690-7442; or

(3) email: program.intake@usda.gov.

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