United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with Iowa Agriculture and Home Economics Experiment Station; Cooperative Extension Service, Iowa State University; and Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

Soil Survey of Van Buren County, Iowa

Part I

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How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map units in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

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** or the **Numerical Index to Map Units** in Part I of this survey, which lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has data on a specific land use for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other 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 1993. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station; the Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Van Buren County Soil and Water Conservation District. Funds appropriated by Van Buren County were used to defray part of the cost of the survey.

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

Cover: An erosion-control structure in an area of the Kniffin-Rinda-Gara association in Van Buren County.

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

Contents

Numerical Index to Map Units

Foreword

This soil survey contains information that can be used in land-planning programs in Van Buren County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, 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.

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. Broad areas of soils are shown on the general soil map. 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.

Leroy Brown
State Conservationist
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Soil Survey of
Van Buren County, Iowa

By John A. Lucassen, Natural Resources Conservation Service

Fieldwork by John R. Allen, Thomas E. Brantmeier, Leland D. Camp, Stephen J. Ernst, Gary Lindgren, John A. Lucassen, and Douglas B. Oelmann

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Iowa Agriculture and Home Economics Experiment Station; the Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship

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 or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

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

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

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

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

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

General Nature of the Survey Area

Van Buren County is in southeastern Iowa (fig. 1). It has an area of 312,800 acres, or 487 square miles. Keosauqua is the county seat. It is in the central part of the county, about 109 miles southeast of Des Moines.

This survey updates the soil survey of Van Buren County published in 1962 (Dietz and Hidlebaugh, 1962). It provides additional information and has larger maps, which show the soils in more detail.

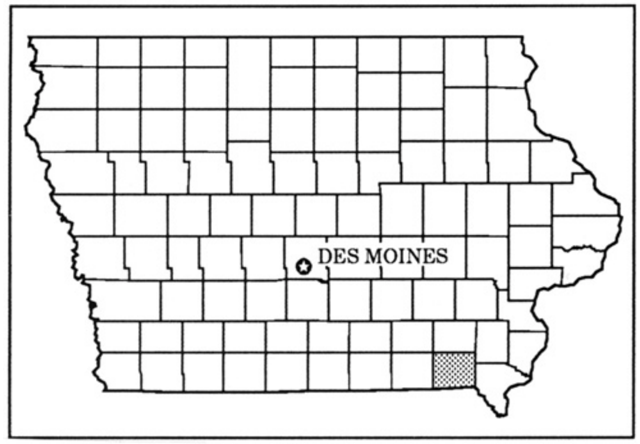

Figure 1.—Location of Van Buren County in Iowa.

History

The survey area was originally acquired by the United States as part of the Louisiana Purchase in 1803. The administration of the area passed through several governmental entities over a period of several years, including the District of Louisiana, the Territory of Louisiana, and the Territory of Missouri. When the State of Missouri was admitted into the Union in 1821, the area that is now Van Buren County was part of a territory that received no attention and was left without any form of government for 13 years. The area was considered part of the unorganized territory of the United States until 1834, when it became part of Des Moines County, Michigan. In April 1836, the area became part of the Wisconsin Territory. Van Buren County was organized on December 7, 1836, and became part of the Territory of Iowa in 1838 (Andreas, 1875).

The Des Moines River runs diagonally from northwest to southeast across the county. It has a length of about 45 miles within the county, and its average width is 800 feet. The depth of the river is uniform throughout the county.

At the time of the Louisiana Purchase, the survey area was inhabited by many Indian tribes and a few white fur trappers and traders. The settlement of the area was precipitated by the Black Hawk Purchase in 1832, by which Indian lands were ceded following the Black Hawk Wars. On June 1, 1833, the territory of the Black Hawk Purchase was legally opened for settlement (Andreas, 1875). The first European settler in Van Buren County was Abel Galland, who made a claim near the site of Farmington sometime in 1833.

The population of Van Buren County grew rapidly during the period of early settlement. In 1860, the population of the county was 17,081 (Western Historical Company, 1879). Because the Des Moines River has declined in importance as a transportation route, the population of the county has dropped considerably since 1860. In 1990, the population was 7,547 (U.S. Department of Commerce, 1990).

Keosauqua was made the county seat in 1839, and a substantial number of county buildings were erected from 1839 to 1840 (Western Historical Company, 1879).

On October 1, 1940, the Van Buren County Soil Conservation District was formed. The first elected commissioners were Halsie Harbin, Elias Heckart, and Frank Wilson.

Transportation Facilities and Agriculture

Two major highways serve Van Buren County. U.S. Highway 2 crosses the county dominantly from east to west, and State Highway 1 crosses the county from north to south. Hard-surface county roads connect these highways to all the smaller communities in the county. All farms and rural residences have access to roads of gravel or crushed limestone. Major county roads are well distributed throughout the county.

Although three railroad freight lines passed through Van Buren County in 1918, none of them exist today. An airport is available at Keosauqua. Motor freight lines service every trading center in the county.

Agriculture is the main economic enterprise in Van Buren County. It provides a livelihood for farmers and for those engaged in business, professions, finance, and many related agribusinesses. Most of the local income results from the sale of livestock and grain.

The most extensively raised livestock in Van Buren County are beef cattle, hogs, and sheep. In 1992, 9,000 head of grain-fed cattle, 130,000 head of market hogs, and 3,000 head of grain-fed lambs were marketed (National Agricultural Statistics Service, 1994).

In 1993, crop production in the county consisted of 37,300 acres of corn, 38,000 acres of soybeans, 600 acres of oats, 29,100 acres of hay, and 3,500 acres of wheat (National Agricultural Statistics Service, 1994). The production from these crops is used in livestock rations or sold on the cash grain market.

The number of farms in Van Buren County has been declining, but the size of the farms is increasing. In 1993, there were 750 farms that made up 291,900 acres. The average farm was 389 acres (National Agricultural Statistics Service, 1994).

Physiography and Drainage

The highest point of elevation in Van Buren County, approximately 830 feet above sea level, is near Milton in the southwest corner of the county. The lowest point, approximately 540 feet above sea level, is at the point where the Des Moines River leaves the county at the eastern boundary, about 2 miles south of Farmington.

Along the Des Moines River and its tributaries, the difference in elevation between the lowlands and the adjoining uplands ranges from 140 to 160 feet. In the southwestern and northeastern parts of the county, the difference in elevation between the lowlands and the adjoining uplands ranges from 60 to 120 feet.

The relief along the Des Moines River and its tributaries is characterized by moderately steep and steep slopes rising from the lowlands (fig. 2). The relief near other, smaller drainage systems is characterized by moderate and strong slopes rising from the lowlands.

The Des Moines River and its tributaries drain about 95 percent of Van Buren County. Lick Creek, Coates Creek, Little Cedar Creek, Rock Creek, and Reeds Creek flow southward into the Des Moines River. These tributaries drain about 45 percent of the county. The Fox River, the Little Fox River, Bear Creek, Holcomb Creek, Big Indian Creek, and Chequest Creek flow eastward into the Des Moines River. They drain about 50 percent of the county (Andreas, 1875).

Tributaries of the Skunk River drain the northeastern part of the county. The Skunk River system drains about 5 percent of the county (Andreas, 1875).

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Keosauqua State Park 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 26 degrees F and the average daily minimum temperature is 16 degrees. The lowest temperature on record, which occurred at Keosauqua on January 22, 1930, is -36 degrees. In summer, the average temperature is 74 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature,

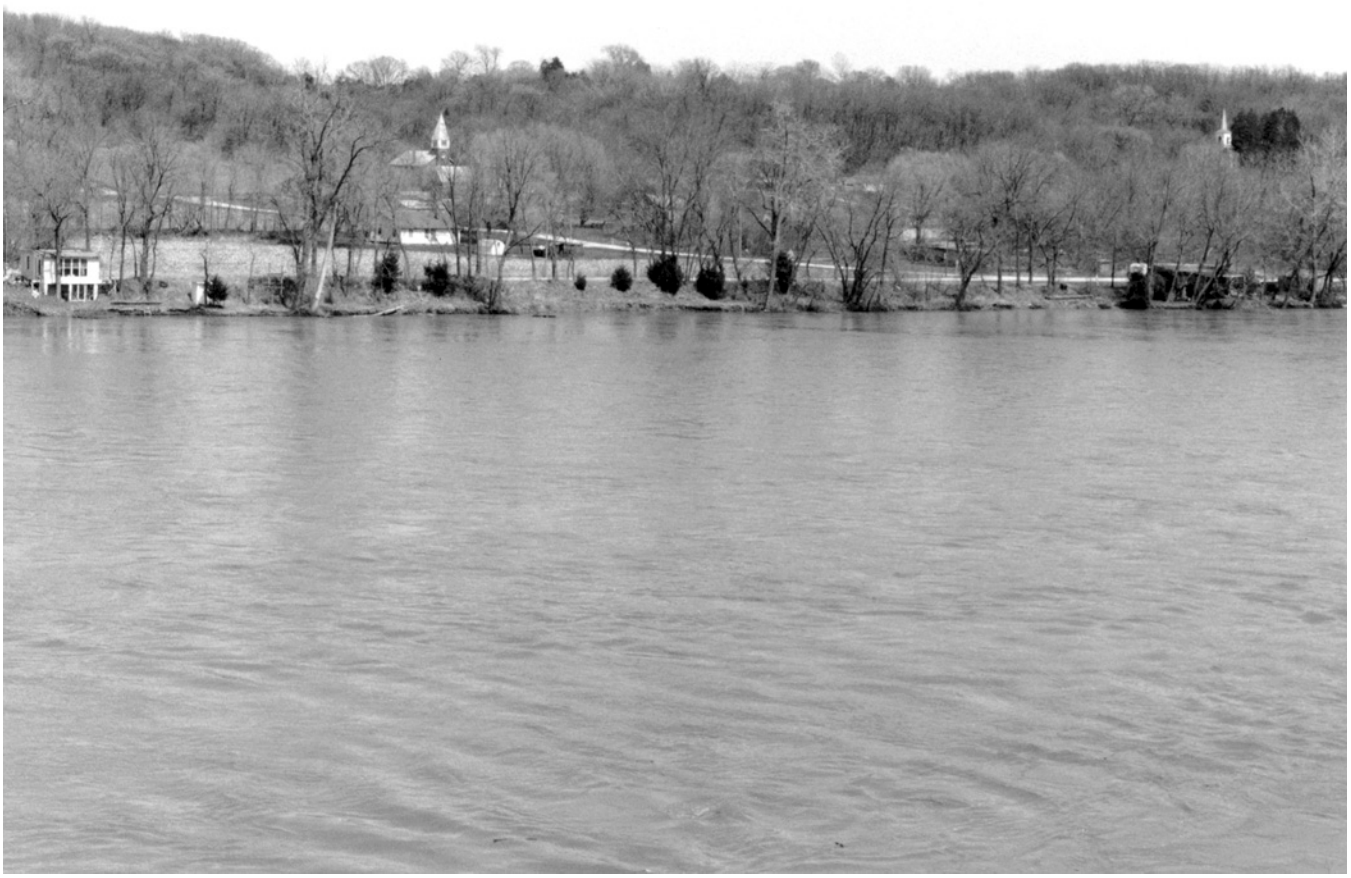

Figure 2.—The village of Bentonsport is in an area of the Nodaway-Coppock-Keosauqua association along the Des Moines River. Lindley soils are on the slopes in the background.

which occurred at Keosauqua on August 9, 1934, is 115 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 about 38 inches. Of this, about 25 inches, or about 66 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest recorded 1-day rainfall was about 11 inches on June 10, 1905. Thunderstorms occur on about 47 days each year, and most occur in July.

The average seasonal snowfall is 25.9 inches. The greatest snow depth at any one time during the period of record was 17 inches. On the average, about 10 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 13 inches.

The average relative humidity in midafternoon is about 59 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 65 percent of the time possible in summer and 46 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 12.1 miles per hour, in March and April.

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Keosauqua State Park, Iowa)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	^oF	^oF	^oF	^oF	^oF	Units	In	In	In		In
January----	32.8	12.9	22.9	61	-20	1	1.35	0.50	2.05	3	7.1
February---	38.4	17.6	28.0	67	-15	2	1.11	.60	1.56	3	6.0
March------	51.0	29.1	40.1	81	2	42	2.75	1.46	3.88	6	3.6
April------	64.8	40.5	52.7	88	19	161	3.68	1.91	5.23	7	1.1
May--------	75.4	50.3	62.9	91	31	402	4.10	2.34	5.65	7	.0
June-------	84.0	59.5	71.8	97	42	653	4.11	2.09	5.87	6	.0
July-------	88.3	64.4	76.3	101	48	809	4.97	2.48	7.13	6	.0
August-----	86.0	61.7	73.9	100	45	740	3.82	1.69	5.65	6	.0
September--	78.3	53.8	66.1	95	32	484	4.59	1.89	6.87	6	.0
October----	67.2	42.6	54.9	88	21	207	3.16	1.15	4.83	5	.2
November---	51.5	31.5	41.5	76	7	38	2.43	.80	3.76	5	1.8
December---	36.5	18.7	27.6	65	-13	3	1.95	1.02	2.77	4	6.1
Yearly:											
Average---	62.9	40.2	51.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	102	-21	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,541	38.02	30.69	44.19	64	25.9

* 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 Keosauqua State Park, Iowa)

Probability	Temperature: 24 ^{o}F or lower	Temperature: 28 ^{o}F or lower	Temperature: 32 ^{o}F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 13	Apr. 24	May 8
2 years in 10 later than--	Apr. 9	Apr. 19	May 4
5 years in 10 later than--	Apr. 1	Apr. 10	Apr. 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 13	Oct. 2	Sept. 21
2 years in 10 earlier than--	Oct. 19	Oct. 8	Sept. 27
5 years in 10 earlier than--	Oct. 30	Oct. 18	Oct. 8

Table 3.--Growing Season

(Recorded in the period 1961-90 at Keosauqua State Park, Iowa)

Probability	Daily minimum temperature during growing season: Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
9 years in 10	189	166	145
8 years in 10	196	174	152
5 years in 10	210	190	165
2 years in 10	224	206	177
1 year in 10	231	214	184

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The soils or miscellaneous areas making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Haig-Grundy-Clarinda Association

Setting

Landform: Uplands
Parent material: Loess and a paleosol weathered from glacial till
Slope range: 0 to 9 percent

Composition

Percent of the survey area: 11
Extent of the components in the association (fig. 3):
Haig soils—52 percent
Grundy soils—30 percent
Clarinda soils—6 percent
Soils of minor extent—12 percent

Soil Properties and Qualities

Haig

Drainage class: Poorly drained
Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 2 percent
Parent material: Loess

Grundy

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent
Parent material: Loess

Clarinda

Drainage class: Poorly drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent
Parent material: Loess over a gray paleosol weathered from glacial till

Minor Soils

- Arispe soils, which have a less clayey subsoil than the major soils; on side slopes and in concave heads of drainageways
- Rinda soils, which have a lighter colored surface layer than the major soils and have a clayey subsoil; on convex side slopes and in concave heads of drainageways
- Pershing soils, which have a lighter colored surface layer than the major soils; on narrow flats, side slopes, and convex nose slopes
- Olmitz, Vesser, and Zook soils, which formed in alluvium; in concave areas on narrow bottom land
- Edina soils, which have a lighter colored subsurface layer than the major soils; in depressions on broad flats

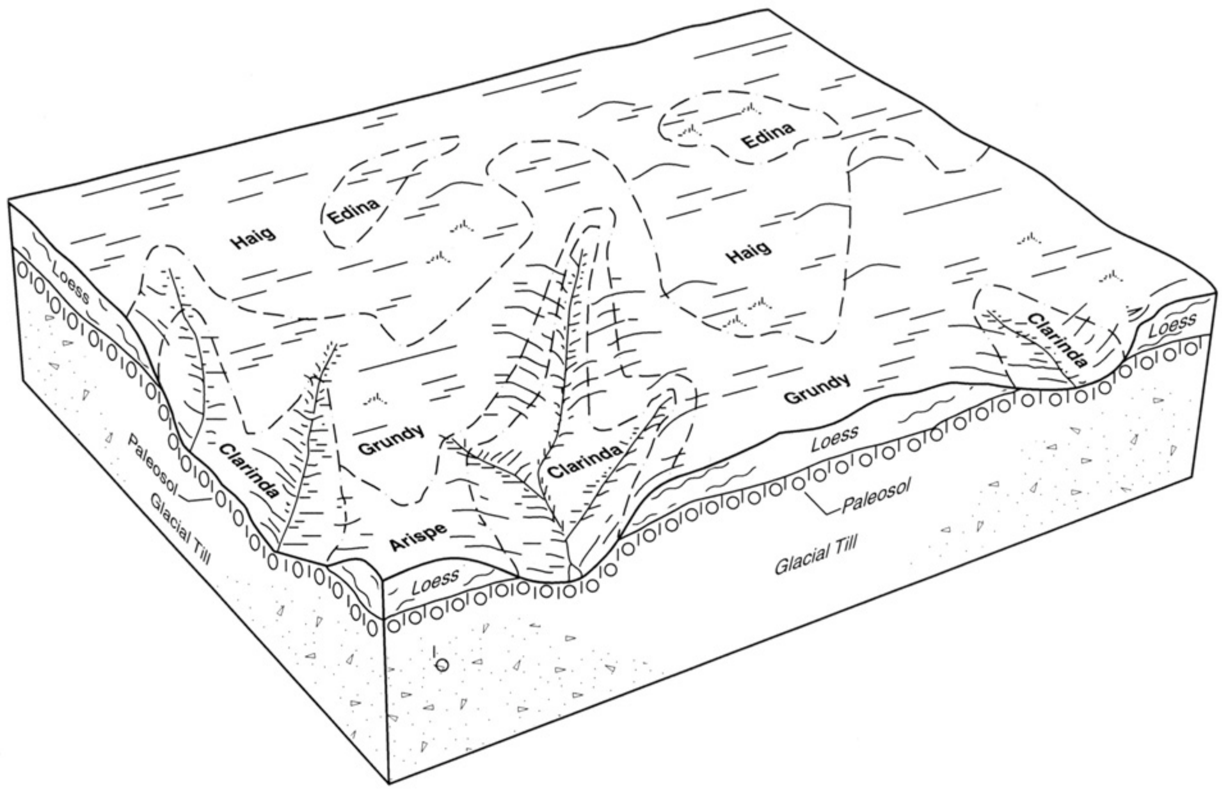

Figure 3.—Typical pattern of soils and parent material in the Haig-Grundy-Clarinda association.

2. Persning-Rinda-Gara Association

Setting

Landform: Uplands
Parent material: Loess, loess and a gray paleosol weathered from glacial till, and glacial till
Slope range: 2 to 18 percent

Composition

Percent of the survey area: 6
Extent of the components in the association:
Pershing soils—68 percent
Rinda soils—12 percent
Gara soils—6 percent
Soils of minor extent—14 percent

Soil Properties and Qualities

Pershing

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 9 percent
Parent material: Loess

Rinda

Drainage class: Poorly drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent
Parent material: Loess over a gray paleosol weathered from glacial till

Gara

Drainage class: Well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 18 percent
Parent material: Glacial till

Minor Soils

• Bucknell soils, which have a clayey subsoil and are shallower over a loamy subsoil than the major soils;

on the more sloping side slopes and in concave heads of drainageways

• Olmitz, Vesser, and Zook soils, which formed in alluvium; in concave areas on narrow bottom land

• Armstrong soils, which have a red, clayey subsoil; on convex nose slopes and side slopes

• Weller soils, which have a lighter colored surface layer than the major soils and have a browner silty subsoil; on side slopes and convex nose slopes

3. Weller-Lindley-Keswick Association

Setting

Landform: Uplands
Parent material: Glacial till, loess, and a paleosol weathered from glacial till
Slope range: 2 to 40 percent

Composition

Percent of the survey area: 31
Extent of the components in the association (fig. 4):
Weller soils—33 percent
Lindley soils—25 percent
Keswick soils—7 percent
Soils of minor extent—35 percent

Soil Properties and Qualities

Weller

Drainage class: Moderately well drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 9 percent
Parent material: Loess

Lindley

Drainage class: Well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 40 percent
Parent material: Glacial till

Keswick

Drainage class: Moderately well drained
Landform: Uplands

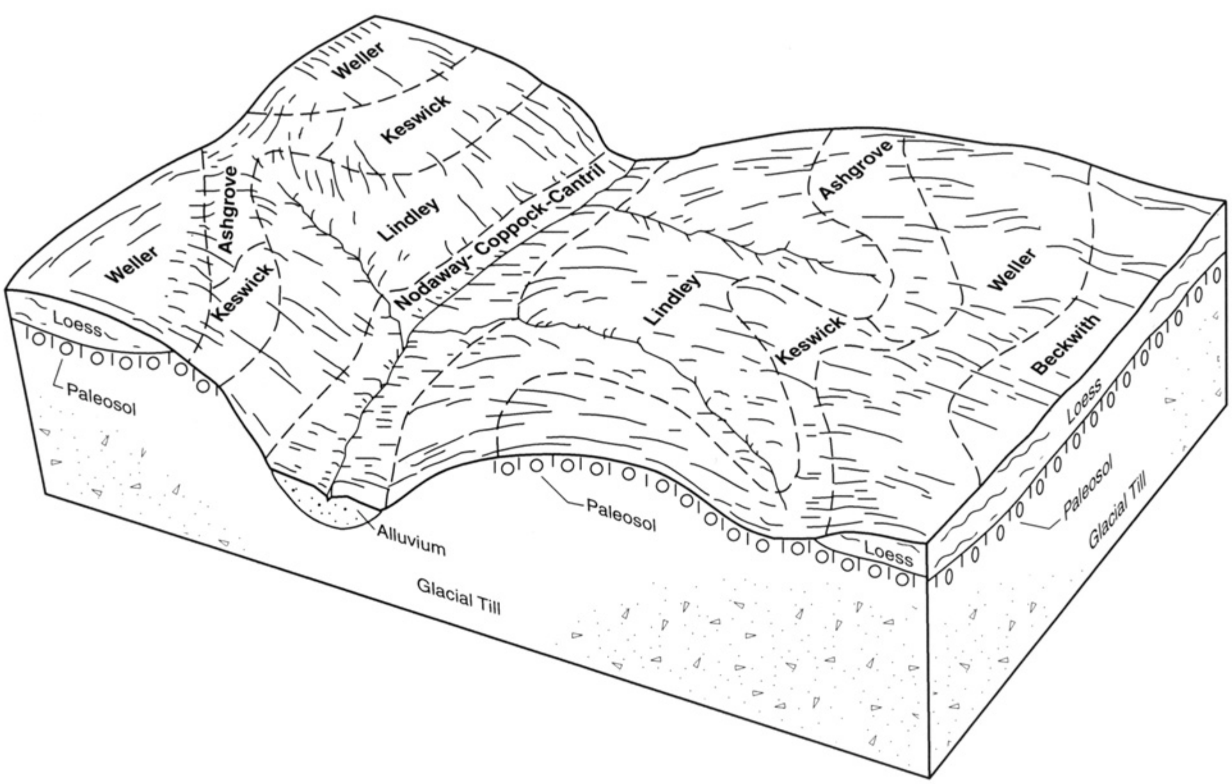

Figure 4.—Typical pattern of soils and parent material in the Weller-Lindley-Keswick association.

Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent
Parent material: Pedisediments over a reddish paleosol weathered from glacial till

Minor Soils

• Ashgrove soils, which have a more clayey subsoil than the major soils; on side slopes and in concave heads of drainageways
• Pershing soils, which are darker than the major soils and have a thicker surface layer; on side slopes and in concave heads of drainageways
• Gorin soils, which formed in loess and have a red, clayey subsoil; on convex nose slopes and side slopes
• Nodaway, Coppock, and Cantril soils, which formed in alluvium; along narrow areas of bottom land
• The poorly drained Beckwith soils in the less sloping areas on narrow upland flats

4. Edina-Seymour-Clarinda Association

Setting

Landform: Uplands
Parent material: Loess and a paleosol weathered from glacial till
Slope range: 0 to 9 percent

Composition

Percent of the survey area: 4
Extent of the components in the association (fig. 5):
Edina soils—56 percent
Seymour soils—32 percent
Clarinda soils—6 percent
Soils of minor extent—6 percent

Soil Properties and Qualities

Edina

Drainage class: Poorly drained and very poorly drained
Landform: Upland flats and depressions
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 2 percent
Parent material: Loess

Seymour

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent
Parent material: Loess

Clarinda

Drainage class: Poorly drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent
Parent material: Loess over a gray paleosol weathered from glacial till

Minor Soils

• Rinda soils, which have a lighter colored surface layer than the major soils and have a clayey subsoil; on convex side slopes and in concave heads of drainageways
• Kniffin soils, which have a lighter colored surface layer than the major soils; on narrow flats, side slopes, and convex nose slopes
• Olmitz, Vesser, and Zook soils, which formed in alluvium; in concave areas on narrow bottom land

5. Kniffin-Rinda-Gara Association

Setting

Landform: Uplands
Parent material: Loess, glacial till, and a paleosol weathered from glacial till
Slope range: 2 to 18 percent

Composition

Percent of the survey area: 15
Extent of the components in the association (fig. 6):
Kniffin soils—38 percent
Rinda soils—20 percent
Gara soils—14 percent
Soils of minor extent—28 percent

Soil Properties and Qualities

Kniffin

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes

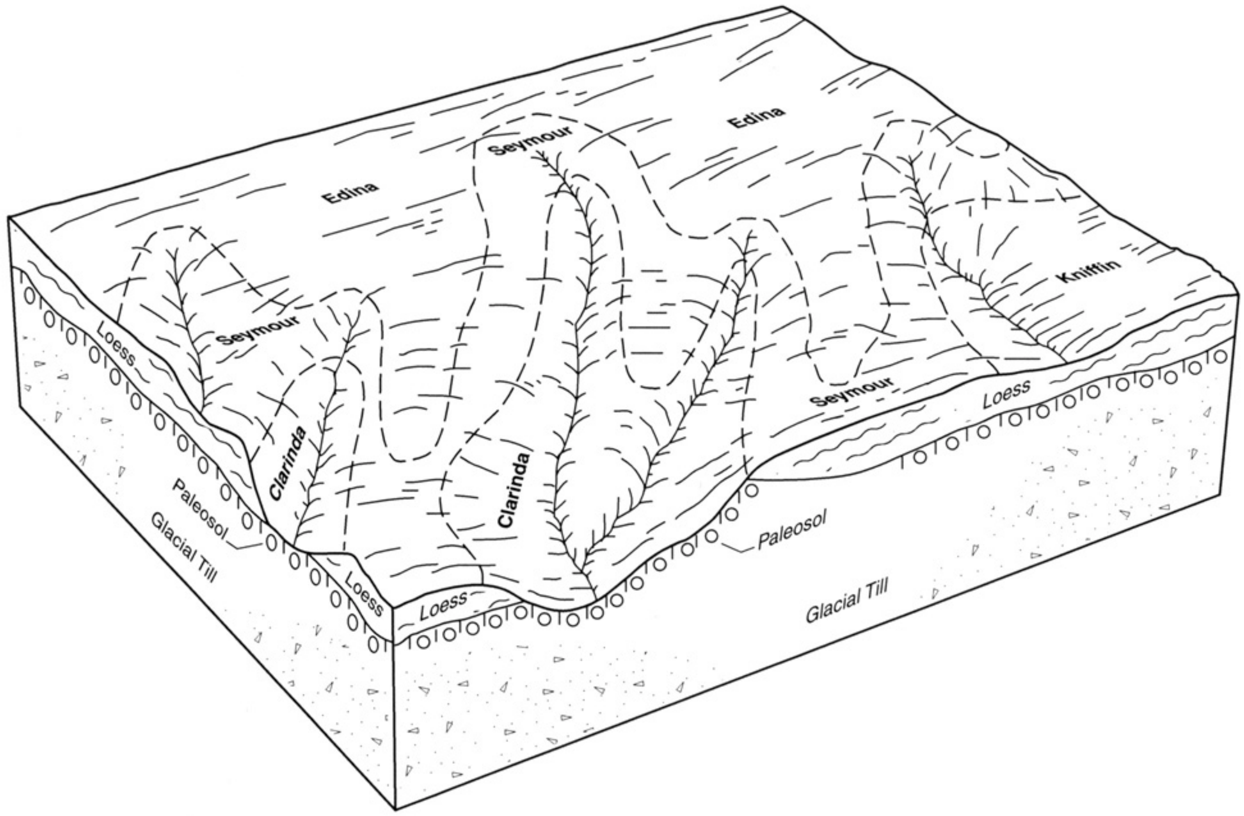

Figure 5.—Typical pattern of soils and parent material in the Edina-Seymour-Clarinda association.

Slope range: 2 to 9 percent
Parent material: Loess

Rinda

Drainage class: Poorly drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent
Parent material: Loess over a gray paleosol weathered from glacial till

Gara

Drainage class: Well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 18 percent
Parent material: Glacial till

Minor Soils

- Bucknell soils, which have a clayey subsoil and are shallower over a loamy subsoil than the major soils; on the more sloping side slopes and in concave heads of drainageways
- Olmitz, Vesser, and Zook soils, which formed in alluvium; in concave areas on narrow bottom land
- Armstrong soils, which have a red, clayey subsoil; on convex nose slopes and side slopes
- The poorly drained Belinda soils in the less sloping areas on narrow upland flats

6. Lindley-Rathbun-Keswick Association

Setting

Landform: Uplands
Parent material: Glacial till, loess, and a paleosol weathered from glacial till
Slope range: 2 to 40 percent

Composition

Percent of the survey area: 18
Extent of the components in the association (fig. 7):
Lindley soils—25 percent
Rathbun soils—24 percent

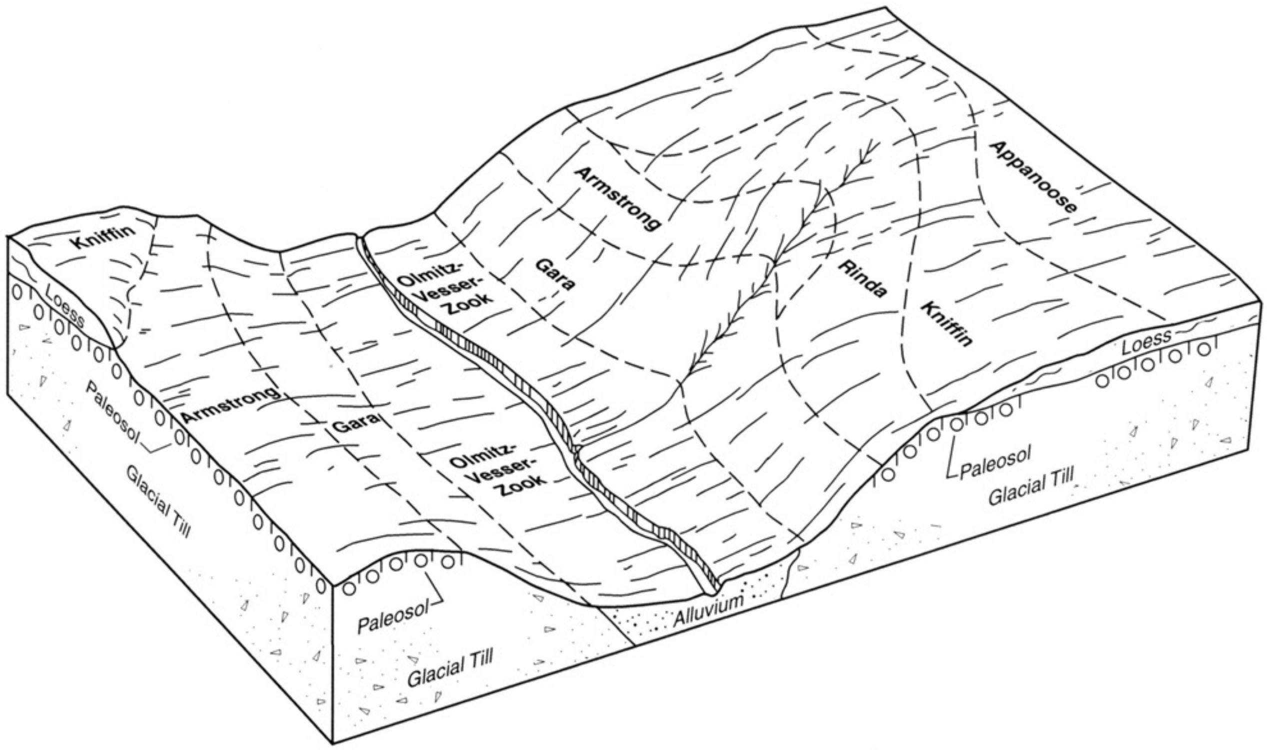

Figure 6.—Typical pattern of soils and parent material in the Kniffin-Rinda-Gara association.

Keswick soils—7 percent
Soils of minor extent—44 percent

Soil Properties and Qualities

Lindley

Drainage class: Well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 40 percent
Parent material: Glacial till

Rathbun

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 9 percent
Parent material: Loess

Keswick

Drainage class: Moderately well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent
Parent material: Pedisediments over a reddish paleosol weathered from glacial till

Minor Soils

- The poorly drained Ashgrove soils, which are more clayey in the subsoil than the major soils; on side slopes and in concave heads of drainageways
- Gorin soils, which formed in loess and have a red, clayey subsoil; on convex nose slopes and side slopes
- Nodaway, Coppock, and Cantril soils, which formed in alluvium; along narrow areas of bottom land
- The poorly drained Beckwith soils in the less sloping areas on narrow flats

7. Weller-Clinton-Galland Association

Setting

Landform: Stream terraces
Parent material: Loess and a paleosol weathered from alluvial sediments

Slope range: 2 to 18 percent

Composition

Percent of the survey area: 8
Extent of the components in the association:
Weller soils—46 percent
Clinton soils—20 percent
Galland soils—11 percent
Soils of minor extent—23 percent

Soil Properties and Qualities

Weller

Drainage class: Moderately well drained
Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 14 percent
Parent material: Loess

Clinton

Drainage class: Moderately well drained
Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 14 percent
Parent material: Loess

Galland

Drainage class: Somewhat poorly drained
Landform: Stream terraces
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 18 percent
Parent material: Pedisediments over a paleosol weathered from glacial till

Minor Soils

- Olmitz, Vesser, and Zook soils, which formed in alluvium; in concave areas on narrow bottom land
- Douds soils, which are less clayey than the major soils and have a more permeable subsoil; on convex side slopes

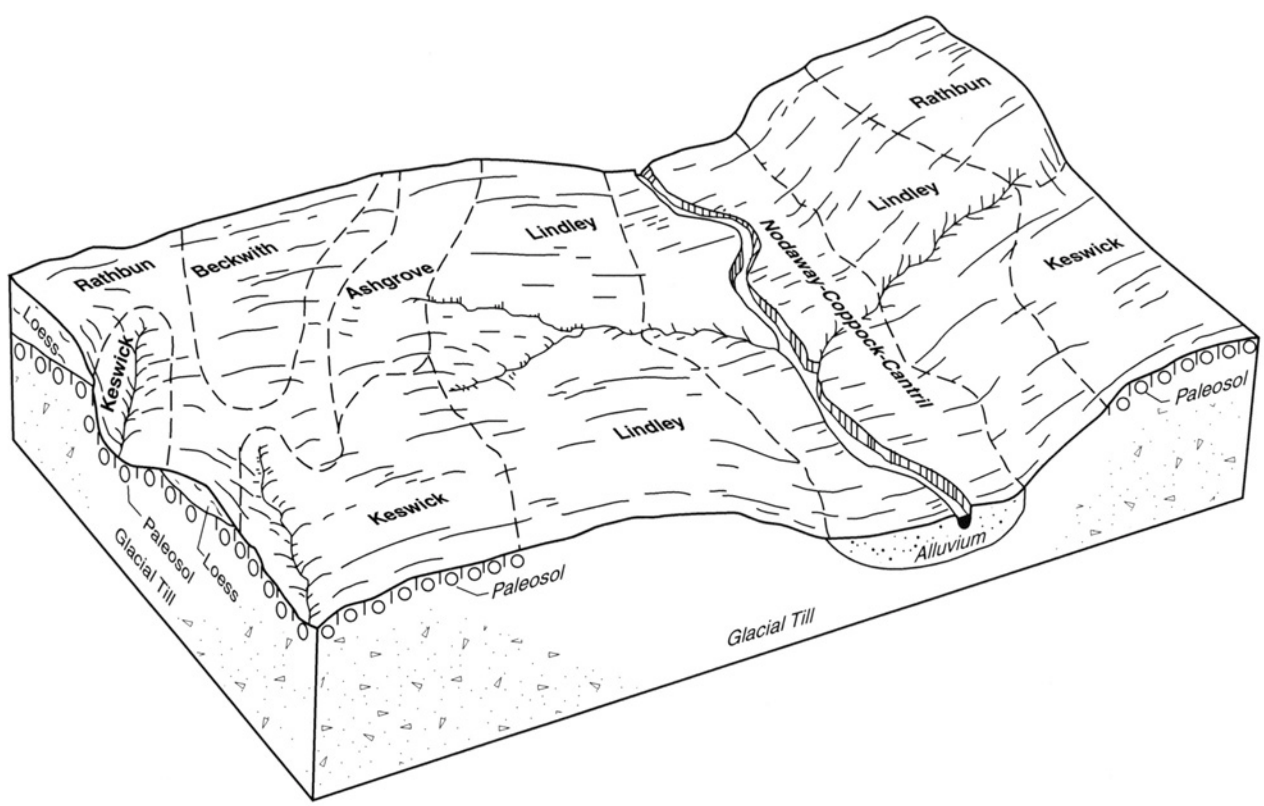

Figure 7.—Typical pattern of soils and parent material in the Lindley-Rathbun-Keswick association.

8. Nodaway-Coppock-Keosauqua Association

Setting

Landform: Flood plains, alluvial fans, and stream terraces
Parent material: Silty and loamy alluvium
Slope range: 0 to 5 percent

Composition

Percent of the survey area: 7
Extent of the components in the association:
Nodaway soils—45 percent
Coppock soils—39 percent
Keosauqua soils—9 percent
Soils of minor extent—7 percent

Soil Properties and Qualities

Nodaway

Drainage class: Moderately well drained
Landform: Flood plains
Slope range: 0 to 3 percent
Parent material: Silty alluvium

Coppock

Drainage class: Somewhat poorly drained and poorly drained
Landform: Flood plains and alluvial fans
Slope range: 0 to 5 percent
Parent material: Silty alluvium

Keosauqua

Drainage class: Well drained
Landform: Stream terraces
Slope range: 1 to 3 percent
Parent material: Stratified alluvium

Minor Soils

- Vesser soils, which have a thicker dark surface layer than the major soils; on flood plains and alluvial fans
- Zook soils, which are more clayey than the major soils and have a dark subsoil; on flood plains
- Ackmore soils, which have a buried dark subsoil; on flood plains and alluvial fans
- Klum soils, which are sandier than the major soils and have a stratified subsoil; on flood plains
- Perks soils, which have a sandy surface layer and subsoil; on flood plains

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and the processes of horizon differentiation and describes the system of soil classification.

Factors and Processes of Soil Formation

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point 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 (Jenny, 1941). Human activities also affect soil formation.

Climate and plant and animal life are the active factors of soil formation. They act on the parent material and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of profile that forms and in extreme cases determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil. Some time is always needed for the development of soil horizons. A long period generally is needed 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 others.

Horizons are differentiated from each other when four basic kinds of change take place. These changes are additions, removals, transfers, and transformations (Simonson, 1959). Each of these kinds of change affects many substances in the soils, such as organic matter, soluble salts, carbonates, sesquioxides, and silicate clay materials. Most of these processes tend to promote horizon differentiation, but some tend to offset or retard it. The processes and the resulting changes occur simultaneously in soils. The ultimate nature of the profile is governed by the balance of these changes within the soil.

An accumulation of organic matter generally is an early phase of horizon differentiation. It has been an important process in the differentiation of horizons in the soils of Van Buren County. The amount of organic matter that has accumulated in the surface layer of the soils ranges from high to very low. In some soils the content of organic matter was once fairly high but is now low because of erosion.

The removal of substances from parts of the soil profile is important in the differentiation of horizons. The downward movement of calcium carbonates and bases is an example. The upper part of the soils in Van Buren County has been leached of calcium carbonate. Many soils have been so strongly leached that they are strongly acid or very strongly acid, even in the subsoil.

Phosphorus is removed from the subsoil by plant roots and transferred to the parts of the plant growing above the ground. It is then returned to the surface layer in the plant residue. This process affects the form and distribution of phosphorus in the profile. The translocation of silicate clay minerals is another important process. The clay minerals in the surface layer are carried downward in suspension by percolating water. They accumulate in the subsoil as fillings in pores and root channels and as clay films. This process has affected many of the soils in the county. In other soils, however, the clay content of the surface layer is not markedly different from that of the underlying layer and other evidence of clay movement is minimal.

Another kind of transfer occurs when cracks form as a result of shrinking and swelling. Because of the cracks, some of the material from the surface layer is transferred to the lower parts of the profile. This transfer is minimal in most of the soils in the survey area. It is most common in very clayey soils. It can be a characteristic of Clarinda, Wabash, and Zook soils.

Transformations are physical and chemical. The weathering of soil particles to smaller sizes is an example of transformation. The reduction of iron is another example. This process is called gleying. It occurs when the soil is saturated for long periods. The soil contains enough organic matter for biological activity to take place during periods of saturation. Gleying is evidenced by ferrous iron and gray colors in the soil. It is characteristic of poorly drained soils, such as Haig soils. The content of reductive extractable iron, or free iron, generally is lower in somewhat poorly drained soils, such as Grundy soils (USDA, 1984). Another kind of transformation is the weathering of the primary apatite minerals in the parent material to secondary phosphorus compounds.

Climate

The soils in Van Buren County have been forming under a midcontinental, subhumid climate for the past 5,000 years (Ruhe, 1956; Ruhe and others, 1957). The morphology and properties of most of the soils indicate that this climate was similar to the present climate. From 6,500 to 16,000 years ago, however, the climate probably was cool and moist and was conducive mostly to the growth of forest vegetation (Ruhe, 1956; Ruhe and others, 1957). A study indicates that the climate during the Sangamon period of the Pleistocene epoch was cool and moist and conducive mainly to the growth of conifers (Lane, 1941).

The influence of the general climate in a region is modified by local conditions in or near the developing soils. For example, soils on south-facing slopes formed under a microclimate that was warmer and drier than the average climate of nearby areas. The low-lying, poorly drained soils on bottom land formed under a wetter and colder climate than that in most of the surrounding areas. These local differences influence the characteristics of the soil and account for some of the differences among soils in the same general climatic region.

Living Organisms and Human Activity

Many changes in climate and vegetation took place in Iowa during the postglacial period (Lane, 1941; Ruhe, 1956). Spruce grew from 12,000 to 8,000 years ago. The spruce was followed by a coniferous-deciduous forest, which lasted until about 6,500 years ago. At that point, grass became the dominant vegetation in the area.

For the past 5,000 years, the soils of Van Buren County seem to have been influenced by prairie grasses and trees. Big bluestem and little bluestem were the main prairie grasses. The dominant trees were deciduous, mainly oak, hickory, ash, elm, and maple.

The effects of vegetation on soils similar to those in Van Buren County have been studied recently. Evidence shows that the vegetation changed while soils formed in areas bordering trees and grasses. The morphology of Appanoose, Armstrong, Belinda, Bucknell, Cantril, Coppock, Gara, Kniffin, Pershing, Rinda, and Tuskeego soils reflects the influence of both trees and grasses. Trees influenced the formation of Ashgrove, Beckwith, Clinton, Douds, Galland, Gosport, Keswick, Lindley, Nordness, Okaw, Rathbun, and Weller soils (Prill and Reicken, 1958). Grasses influenced the formation of Arispe, Chequest, Clarinda, Colo, Edina, Grundy, Haig, Olmitz, Richwood, Seymour, Vesser, Wabash, and Zook soils.

Soils that formed under trees are lighter in color and more acid than soils that formed under grasses, and they have a thinner surface layer. The soils in Van Buren County that formed under changing vegetation or mixed grasses and trees have properties that are intermediate between those of soils that formed under grasses and those of soils that formed under trees.

Important changes take place when the soil is cultivated. Some of these changes have little effect on productivity; others have a drastic effect. The changes caused by water erosion generally are the most significant. On many of the cultivated soils in the county, particularly the gently rolling to hilly soils, part or all of the original surface layer has been lost through sheet erosion. In places, shallow to deep gullies have formed.

In many fields that are cultivated year after year, the granular structure that was apparent when the grassland was undisturbed has broken down. In these fields the surface tends to crust and harden when it dries. Puddles tend to form in areas of fine textured soils that have been plowed when too wet. Also, these soils are less permeable than similar soils in undisturbed areas.

Humans have increased the productivity of some soils. Large areas of bottom land have been made suitable for cultivation because drainage ditches have been dug and diversions have been constructed at the foot of slopes. The cropland in areas of Edina and Haig soils on broad flats has been greatly improved because a drainage system has been installed.

Deficiencies in plant nutrients have been improved in some areas. Some soils are more productive than they were in their natural state because of applications of commercial fertilizer.

Topography

Relief is an important cause of differences among soils. It indirectly influences soil formation through its effect on drainage. In Van Buren County, slope ranges from level to very steep. In many areas on the bottom land, the nearly level soils are occasionally flooded and have a permanent or temporary high water table. In depressions, water soaks into the nearly level soils that are subject to flooding. Much of the rainfall runs off the steep soils on uplands.

Level soils are on the broad upland flats and on the bottom land along streams. The steepest soils in the county are generally on the southern and western sides of the major streams and their tributaries. The intricate pattern of upland drainageways indicates that the landscape in practically the entire county has been modified by geologic processes.

Beckwith, Belinda, Edina, and Haig soils, which formed in areas where the water table is high, have a dominantly grayish subsoil. Grundy, Pershing, and Seymour soils formed in areas where the water table fluctuated and was periodically high. Gara, Lindley, and other soils that formed in areas where the water table was below the subsoil have a yellowish brown subsoil. Haig soils formed under prairie grasses and have a high water table. They contain more organic matter in the surface layer than well drained soils that formed under prairie grasses. Clay accumulates in the subsoil of Edina and other soils that are in slight depressions or nearly level areas. A large amount of water enters the soils and carries the clay particles downward. Edina soils are commonly considered “claypan” soils because they have a very slowly permeable subsoil, in which the greatest amount of clay accumulates.

Pershing and Weller soils were studied for the purpose of determining the effects of relief on soils. From areas of these soils on stable slopes to areas on unstable slopes, tests showed an increase in content of clay in the A horizon and a decrease in thickness of the A horizon. Thus, the soils on the more stable slopes are more developed than those on unstable slopes.

In Gara, Lindley, and other soils that have a wide range in slope and are on many kinds of slopes, the depth to carbonates is shallowest where the slopes are steepest, are convex, or are most unstable.

Parent Material

Most of the soils in Van Buren County formed in glacial till, or ice-laid material; loess, or windblown material; and alluvium, or water-laid material. In some areas the soil formed in material weathered from shale. In a few areas, limestone is the parent material.

Glacial till. In Van Buren County, the major Pleistocene depositions of pre-Wisconsin age are Nebraskan and Kansan drift (Scholtes and others, 1951). The Kansan drift is identifiable throughout the county, and on side slopes it forms an extensive part of the landscape. The Nebraskan drift, however, is not readily identifiable on the surface in Van Buren County.

In some deep road cuts and along some of the major stream valleys, the Aftonian paleosol is present below the Kansan glacial till (Kay, 1916; Kay and Apfel, 1929). It consists mainly of glacial till made up of coarse fragments in a clay loam matrix. The upper part of this till consists of yellowish brown material that is oxidized and leached. Below this zone is dark gray material that is calcareous, contains limestone and dolomite particles, and is neither oxidized nor leached.

Soils formed on the Kansan till plain during the Yarmouth and Sangamon interglacial ages, before the loess was deposited. On nearly level interstream divides, the soils were strongly weathered and had a gray, plastic subsoil consisting of paleosol and referred to as gumbotil. This gumbotil is several feet thick and is very slowly permeable. Ashgrove, Bucknell, Clarinda, and Rinda soils formed in this paleosol. They are extensive throughout Van Buren County.

Geologic erosion has cut below the Yarmouth-Sangamon paleosol and into the Kansan till and older deposits. Generally, a stone line or subjacent till that is overlain by pedisediment is at the depth to which this erosion has cut (Ruhe, 1956; Ruhe and Daniels, 1958). A paleosol has formed in the pedisediment stone line and in the subjacent till. Armstrong and Keswick soils formed in this material.

Geologic erosion removed the loess from many slopes and exposed strongly eroded, weathered paleosols. In some places, the paleosols have been beveled or truncated and only the lower part of the strongly weathered materials remains. In other places erosion removed all of the paleosols and exposed till that is only slightly weathered. Erosion cut through below the Yarmouth-Sangamon paleosol during the Late Sangamon (Ruhe, 1956; Ruhe, 1959). The material below the paleosols consists of loamy sediments over a stone line that, in turn, overlies a highly weathered, clayey, reddish brown, acid till. Material that formed during the Late Sangamon period is exposed on the narrow, slightly lowered interstream divides on some side slopes.

Armstrong and Keswick soils formed in this Late Sangamon material. Douds and Galland soils formed in pre-Sangamon sediments of valley fills. These sediments are old alluvium of glacial origin and have a variety of textures (Ruhe, 1959). Douds and Galland soils are on low, stepped interfluves above the present drainage system. The characteristics of the landscape are partly a result of valley fill, but the surface merges with the present erosional uplands. These soils are in distinctly lower positions on the landscape than Gara and Lindley soils, which formed on dissection slopes of Late Wisconsin age. The Sangamon erosional sediments apparently have been angularly truncated in many places. As a result, they generally consist of an irregular mixture of materials that have contrasting textures.

Loess. Loess of Wisconsin age covers most of Van Buren County. It is an extensive parent material in the county (Ruhe and others, 1957; Ruhe and Scholtes, 1955). It consists of accumulated particles of silt and clay that have been deposited by the wind. Variations in soils are related to the distance of the soils from the source of the loess. The source of the loess in Van Buren County is probably the bottom land along the Missouri River in the western part of Iowa (Hutton, 1947).

On the stable upland divides, the loess is about 8 feet thick in the northern part of the county and about 5 feet thick in the southern part. Grundy, Haig, Kniffin, Pershing, and Weller soils are the dominant loess soils. The Appanoose, Arispe, Beckwith, Belinda, Clinton, Edina, Rathbun, and Seymour soils in Van Buren County also were derived from loess. Many of the high benches along the major streams are covered with loess. The loess on these benches contains slightly less clay and slightly more sand than the loess that covers the uplands. The soil material underlying the loess in these areas is stratified alluvium that is generally high in content of sand and gravel.

Alluvium. Alluvium consists of sediments that have been laid down by water. As these sediments move, they are sorted to some extent; but they are as well sorted as loess in only a few places. Also, alluvium does not have the wide range of particle sizes that occurs in glacial drift. Because the alluvium in Van Buren County is derived from loess and glacial drift, it is mainly a mixture of silt and clay, of silt and sand, or of sand and gravel. The coarse sand and gravel generally are only in the pre-Sangamon alluvial sediments on the stream benches. Sediments that accumulated at the foot of the slope on which they originated are called colluvium or local alluvium. The soils on flood plains and bottom land and along drainageways formed in alluvium. As the river overflows its channel and the water spreads over the flood plains, coarse textured materials, such as sand and coarse silt, are deposited first. As the floodwater spreads, it moves more slowly; thus, the finer textured sediments are deposited. As the floodwater recedes, the clay particles, which are the finest textured, settle from the water that is left standing on the lowest part of the flood plain.

Nodaway, Klum, and Perks soils commonly are closest to the stream channel and are coarser textured than the other soils on bottom land. Chequest, Okaw, Richwood, Tuskeego, and Zook soils are along the Des Moines River and its tributaries, and commonly they are away from the meanders of the stream. Zook soils commonly are on the lower part of the bottom land and are the finest textured soils derived from alluvium in the county. Coppock and Vesser soils are along the smaller streams in the county. These soils are widely distributed throughout the county. In places they formed in local alluvium at the base of upland slopes. Cantril and Olmitz soils are the dominant soils that formed in local alluvium in the county. They commonly contain more sand than the other soils that formed in alluvium and typically are in lower positions on the landscape than the surrounding soils derived from glacial materials. Colo soils also formed in local alluvium. The soils surrounding Colo soils are derived from loess.

Shale residuum. Some of the oldest parent material in the county is a series of shale beds deposited during the Des Moines sedimentary cycle in the Pennsylvanian period. These beds consist of shale of different colors and textures, conglomerate, and few organic layers, such as coal. The thickness of these layers or beds varies widely.

Soils that formed in shale residuum in southern Iowa have a wide range in texture, reaction, and other characteristics. Colors of the shale range from nearly black to red, but red, brown, and grayish colors are dominant. Thin beds of sandstone and coal are between layers of shale in places. Gosport soils formed in material weathered from brownish and grayish shales.

Limestone. The oldest parent material in the county is a series of limestone beds deposited during the Mississippian and Pennsylvanian periods (Wood, 1935). The beds range from a few inches to several feet in thickness. Nordness soils formed in limestone. The thicker beds are good sources of road aggregate and agricultural lime.

Several layers of limestone are commonly exposed on the slopes along the major streams and their tributaries. In most places, this exposed rock is many feet thick and rock fragments are on the side slope below the outcrop.

Time

The length of time required for a soil to form affects the kind of soil that forms. An older or more strongly developed soil has well defined genetic horizons, whereas a less well developed soil has no genetic horizons or has only weakly defined ones. Most soils on the flood plains are weakly developed because they have not been in place long enough for the development of distinct horizons.

On the steeper soils, material is generally removed before a thick profile with strongly defined horizons has had time to develop. Even though the material has been in place for a long time, the soil may be immature because much of the water runs off the slopes rather than through the soil material. Gara and Lindley soils formed on recently dissected slopes of late Wisconsin age (Ruhe, 1956; Ruhe, 1959). These soils are no more than 11,000 to 14,000 years old and probably are much younger.

Ashgrove, Armstrong, Keswick, Clarinda, Rinda, and Galland soils are among the oldest soils in the county (Ruhe, 1959; Ruhe and Scholtes, 1955). Clarinda, Rinda, and Ashgrove soils formed in Kansan glacial till during the Yarmouth-Sangamon period. Armstrong, Keswick, and Galland soils formed in material deposited during the Late Sangamon interglacial stage. This material is much older than the loessial parent material of Arispe, Beckwith, Belinda, Clinton, Edina, Grundy, Haig, Kniffin, Pershing, Rathbun, Seymour, and Weller soils. These soils are no older than 14,000 to 16,000 years, and they may be considered younger (Ruhe, 1959).

Radiocarbon studies of wood fragments and organic matter in loess and glacial till have made it possible to determine the approximate ages of soils and of loess and glacial deposits of Iowa. In Van Buren County, the loess is thickest in the nearly level soils on stable upland divides. It is underlain by a Yarmouth-Sangamon paleosol that is on the Kansan till surface. In many places below the stable uplands, an organic layer is at the base of the loess. Organic matter below the solum of Edina and Haig soils in Wayne County, Iowa, had radiocarbon ages of 19,000 to 20,000 years.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 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 4 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

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

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

Table 5 shows the acreage and proportionate extent of the soils in the survey area.

Table 4.--Classification of the Soils

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

Soil name	Family or higher taxonomic class
Adco	Vertic Albaqualfs, fine, montmorillonitic, mesic
Armstrong	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Ashgrove	Aeric Chromic Vertic Epiaqualfs, fine, montmorillonitic, mesic
Appanoose	Vertic Albaqualfs, fine, montmorillonitic, mesic
Aquents	Aquents
*Arispe	Aquertic Argiudolls, fine, montmorillonitic, mesic
Beckwith	Chromic Vertic Albaqualfs, fine, montmorillonitic, mesic
Belinda	Vertic Albaqualfs, fine, montmorillonitic, mesic
Bentonsport	Typic Hapludolls, loamy-skeletal, mixed, mesic
Bucklick	Typic Hapludalfs, fine, mixed, mesic
Bucknell	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Cantril	Udollic Ochraqualfs, fine-loamy, mixed, mesic
Carlow	Vertic Endoaquolls, fine, montmorillonitic, mesic
Chequest	Vertic Endoaquolls, fine, montmorillonitic, mesic
*Clarinda	Vertic Argiaquolls, fine, montmorillonitic, mesic
Clinton	Chromic Vertic Hapludalfs, fine, montmorillonitic, mesic
Colo	Cumulic Endoaquolls, fine-silty, mixed, mesic
Coppock	Mollic Endoaqualfs, fine-silty, mixed, mesic
Creal	Aeric Endoaqualfs, fine-silty, mixed, mesic
Douds	Typic Hapludalfs, fine-loamy, mixed, mesic
Edina	Vertic Argialbolls, fine, montmorillonitic, mesic
Galland	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Gara	Mollic Hapludalfs, fine-loamy, mixed, mesic
Gorin	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Gosport	Typic Dystrochrepts, fine, illitic, mesic
Grundy	Aquertic Argiudolls, fine, montmorillonitic, mesic
Haig	Vertic Argiaquolls, fine, montmorillonitic, mesic
Hoopeston	Aquic Hapludolls, coarse-loamy, mixed, mesic
Keosauqua	Typic Argiudolls, fine-loamy, mixed, mesic
Keswick	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Klum	Mollic Udifluvents, coarse-loamy, mixed, nonacid, mesic
Kniffin	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Lawson	Cumulic Hapludolls, fine-silty, mixed, mesic
Lindley	Typic Hapludalfs, fine-loamy, mixed, mesic
Mt. Sterling	Aeric Fluvaquents, fine-silty, mixed, nonacid, mesic
Mystic	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Nodaway	Mollic Udifluvents, fine-silty, mixed, nonacid, mesic
Nordness	Lithic Hapludalfs, loamy, mixed, mesic
Okaw	Vertic Albaqualfs, fine, montmorillonitic, mesic
Olmitz	Cumulic Hapludolls, fine-loamy, mixed, mesic
Orthents	Typic Udorthents, loamy, mixed, mesic
Perks	Typic Udipsamments, mixed, mesic
Pershing	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Racoon	Typic Endoaqualfs, fine-silty, mixed, mesic
Rathbun	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Reedscreek	Mollic Udifluvents, loamy-skeletal, mixed, nonacid, mesic
Richwood	Typic Argiudolls, fine-silty, mixed, mesic
Rinda	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Seymour	Aquertic Argiudolls, fine, montmorillonitic, mesic
Tuskeego	Mollic Endoaqualfs, fine, montmorillonitic, mesic
Vesser	Argiaquic Argialbolls, fine-silty, mixed, mesic
Wabash	Vertic Endoaquolls, fine, montmorillonitic, mesic
Weller	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Zook	Cumulic Vertic Endoaquolls, fine, montmorillonitic, mesic

Table 5.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
13B	Olmitz-Vesser-Zook complex, 0 to 5 percent slopes	3,540	1.1
23C2	Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded	1,669	0.5
51	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded	2,483	0.8
51+	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	581	0.2
51B	Vesser silt loam, 2 to 5 percent slopes, rarely flooded	547	0.2
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	679	0.2
58D	Douds loam, 9 to 14 percent slopes	11	*
58D2	Douds loam, 9 to 14 percent slopes, moderately eroded	1,042	0.3
58E2	Douds loam, 14 to 18 percent slopes, moderately eroded	1,014	0.3
58F2	Douds loam, 18 to 25 percent slopes, moderately eroded	201	0.1
58G	Douds loam, 25 to 40 percent slopes	941	0.3
65D	Lindley loam, 9 to 14 percent slopes	230	0.1
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	2,661	0.9
65E	Lindley loam, 14 to 18 percent slopes	1,811	0.6
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	11,747	3.8
65F2	Lindley loam, 18 to 25 percent slopes, moderately eroded	6,141	2.0
65G	Lindley loam, 25 to 40 percent slopes	13,876	4.4
80B	Clinton silt loam, 2 to 5 percent slopes	85	*
80C	Clinton silt loam, 5 to 9 percent slopes	198	0.1
80C2	Clinton silty clay loam, 5 to 9 percent slopes, moderately eroded	432	0.1
80D	Clinton silt loam, 9 to 14 percent slopes	438	0.1
80D2	Clinton silty clay loam, 9 to 14 percent slopes, moderately eroded	851	0.3
130	Belinda silt loam, 0 to 2 percent slopes	4,354	1.4
131B	Pershing silt loam, 2 to 5 percent slopes	6,349	2.0
131B2	Pershing silty clay loam, 2 to 5 percent slopes, moderately eroded	1,460	0.5
131C	Pershing silt loam, 5 to 9 percent slopes	339	0.1
131C2	Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded	6,232	2.0
132B	Weller silt loam, 2 to 5 percent slopes	6,730	2.2
132C	Weller silt loam, 5 to 9 percent slopes	2,715	0.9
132C2	Weller silty clay loam, 5 to 9 percent slopes, moderately eroded	15,743	5.0
139	Perks loamy sand, 0 to 2 percent slopes, occasionally flooded	51	*
139B	Perks loamy sand, 2 to 5 percent slopes, rarely flooded	361	0.1
172	Wabash silty clay, 0 to 2 percent slopes, occasionally flooded	1,146	0.4
173	Hoopeston sandy loam, 0 to 2 percent slopes	414	0.1
179D2	Gara clay loam, 9 to 14 percent slopes, moderately eroded	3,982	1.3
179E2	Gara clay loam, 14 to 18 percent slopes, moderately eroded	2,940	0.9
197	Reedscreek loam, 0 to 3 percent slopes, occasionally flooded	298	0.1
208	Klum fine sandy loam, 0 to 2 percent slopes, occasionally flooded	751	0.2
211	Edina silt loam, depressional, 0 to 1 percent slopes	921	0.3
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	6,913	2.2
222C2	Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	3,289	1.1
223C2	Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded	11,075	3.5
231	Edina silt loam, 0 to 2 percent slopes	10,283	3.3
260	Beckwith silt loam, 0 to 2 percent slopes	1,786	0.6
261	Appanoose silt loam, 0 to 2 percent slopes	2,314	0.7
263	Okaw silt loam, 0 to 2 percent slopes, rarely flooded	70	*
273B	Olmitz loam, 2 to 5 percent slopes	209	0.1
273C	Olmitz loam, 5 to 9 percent slopes	50	*
312B	Seymour silt loam, 2 to 5 percent slopes	4,070	1.3
312B2	Seymour silty clay loam, 2 to 5 percent slopes, moderately eroded	2,128	0.7
313D2	Gosport silty clay loam, 9 to 14 percent slopes, moderately eroded	452	0.1
313E2	Gosport silty clay loam, 14 to 18 percent slopes, moderately eroded	1,242	0.4
313F2	Gosport silty clay loam, 18 to 25 percent slopes, moderately eroded	696	0.2
313G	Gosport silt loam, 25 to 40 percent slopes	1,654	0.5
315	Nodaway-Klum-Perks complex, 0 to 3 percent slopes, occasionally flooded	1,885	0.6
362	Haig silt loam, 0 to 2 percent slopes	17,377	5.6
363	Haig silty clay loam, 0 to 1 percent slopes	1,309	0.4
364B	Grundy silt loam, 2 to 5 percent slopes	7,548	2.4
364B2	Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded	3,126	0.1
423D2	Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded	3,668	1.2
424D2	Lindley-Keswick complex, 9 to 14 percent slopes, moderately eroded	3,503	1.1
424E2	Lindley-Keswick complex, 14 to 18 percent slopes, moderately eroded	1,780	0.6
425D	Keswick loam, 9 to 14 percent slopes	2,340	0.7

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
425D2	Keswick clay loam, 9 to 14 percent slopes, moderately eroded	5,191	1.7
432C2	Gorin silty clay loam, 3 to 9 percent slopes, moderately eroded	118	*
432D	Gorin silt loam, 9 to 14 percent slopes	1,329	0.4
432D2	Gorin silty clay loam, 9 to 14 percent slopes, moderately eroded	8,825	2.8
453	Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded	149	*
460	Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded	618	0.2
520	Coppock silt loam, 0 to 2 percent slopes, occasionally flooded	1,703	0.5
520B	Coppock silt loam, 2 to 5 percent slopes, rarely flooded	1,686	0.5
531B	Kniffin silt loam, 2 to 5 percent slopes	6,706	2.1
531B2	Kniffin silty clay loam, 2 to 5 percent slopes, moderately eroded	1,927	0.6
531C2	Kniffin silty clay loam, 5 to 9 percent slopes, moderately eroded	9,676	3.1
532B	Rathbun silt loam, 2 to 5 percent slopes	1,629	0.5
532C	Rathbun silt loam, 5 to 9 percent slopes	1,247	0.4
532C2	Rathbun silty clay loam, 5 to 9 percent slopes, moderately eroded	5,919	1.9
534	Carlow silty clay, 0 to 2 percent slopes, occasionally flooded	603	0.2
592D2	Mystic clay loam, 9 to 14 percent slopes, moderately eroded	159	0.1
594D2	Galland loam, 9 to 14 percent slopes, moderately eroded	1,156	0.4
598G	Bucklick silt loam, 18 to 35 percent slopes	4	*
599G	Nordness-Gosport complex, 25 to 40 percent slopes	794	0.3
632B	Adco silt loam, 1 to 5 percent slopes	83	*
699G	Nordness-Bentonsport complex, 25 to 40 percent slopes	1,523	0.5
719B	Creal silt loam, 2 to 5 percent slopes, rarely flooded	346	0.1
720	Racoon silt loam, 0 to 2 percent slopes, occasionally flooded	173	0.1
729	Nodaway-Coppock complex, 0 to 2 percent slopes, occasionally flooded	578	0.2
730B	Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes	8,283	2.6
792D2	Armstrong clay loam, 9 to 14 percent slopes, moderately eroded	2,718	0.9
795C2	Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded	1,934	0.6
795D	Ashgrove silty clay loam, 9 to 14 percent slopes	674	0.2
795D2	Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded	8,309	2.7
831B	Pershing silt loam, bench, 2 to 5 percent slopes	1,731	0.6
831C2	Pershing silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	1,129	0.4
832B	Weller silt loam, bench, 2 to 5 percent slopes	3,868	1.2
832C	Weller silt loam, bench, 5 to 9 percent slopes	167	0.1
832C2	Weller silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	5,663	1.8
832D2	Weller silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	1,506	0.5
880B	Clinton silt loam, bench, 2 to 5 percent slopes	1,100	0.4
880C	Clinton silt loam, bench, 5 to 9 percent slopes	366	0.1
880C2	Clinton silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	1,682	0.5
880D	Clinton silt loam, bench, 9 to 14 percent slopes	252	0.1
880D2	Clinton silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	1,334	0.4
977	Richwood silt loam, 0 to 2 percent slopes	718	0.2
993D2	Gara-Armstrong complex, 9 to 14 percent slopes, moderately eroded	1,379	0.4
994D2	Galland-Douds complex, 9 to 14 percent slopes, moderately eroded	1,506	0.5
994E2	Galland-Douds complex, 14 to 18 percent slopes, moderately eroded	1,412	0.5
1130	Belinda silt loam, bench, 0 to 2 percent slopes	2,232	0.7
1260	Beckwith silt loam, bench, 0 to 2 percent slopes	1,819	0.6
1715	Nodaway-Vesser-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	2,638	0.8
1977	Keosauqua loam, 1 to 3 percent slopes	1,346	0.4
3051	Vesser silt loam, 0 to 2 percent slopes, rarely flooded	356	0.1
3054	Zook silty clay loam, 0 to 2 percent slopes, rarely flooded	231	0.1
3133	Colo silty clay loam, 0 to 2 percent slopes, rarely flooded	406	0.1
3139	Perks loamy sand, 0 to 2 percent slopes, rarely flooded	438	0.1
3208	Klum fine sandy loam, 0 to 2 percent slopes, rarely flooded	385	0.1
3220	Nodaway silt loam, 0 to 2 percent slopes, rarely flooded	1,666	0.5
3315	Nodaway-Klum-Perks complex, 0 to 3 percent slopes, rarely flooded	380	0.1
3484	Lawson silt loam, 0 to 2 percent slopes, rarely flooded	385	0.1
3520	Coppock silt loam, 0 to 2 percent slopes, rarely flooded	839	0.3
3587	Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded	170	0.1
3720	Racoon silt loam, 0 to 2 percent slopes, rarely flooded	80	*
5010	Pits, sand and gravel	172	0.1
5020	Pits and Dumps	268	0.1
5030	Pits, limestone quarries	405	0.1

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
5040	Orthents, loamy	300	0.1
5047	Aquents, ponded, occasionally flooded	10	*
AW	Animal waste	6	*
SL	Sewage lagoon	47	*
W	Water	5,617	1.8
	Total	312,800	100.0

* Less than 0.1 percent.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each series description is followed by descriptions of the associated detailed soil map units.

Characteristics of the soil and the material in which it formed are identified for each soil 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). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units 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. More information about each map unit is given in Part II of this survey.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. 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 and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. 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 included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit. The principal hazards and limitations to be considered in planning for specific uses are described in Part II of this survey.

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

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into ***soil phases***. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Pershing silt loam, 2 to 5 percent slopes, is a phase of the Pershing 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. Olmitz-Vesser-Zook complex, 0 to 5 percent slopes, 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 Pits, limestone quarries, is an example.

Table 5 in Parts I and II of this survey gives the acreage and proportionate extent of each map unit. Other tables (see Contents in Part II) 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.

Adco Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 1 to 5 percent

Typical Pedon

Adco silt loam, 1 to 5 percent slopes, 2,400 feet north and 1,500 feet west of the southeast corner of sec. 2, T. 63 N., R. 7 W.; USGS St. Patrick, Missouri, Topographic Quadrangle; latitude 40 degrees 16 minutes 22 seconds N. and longitude 91 degrees 38 minutes 03 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

E—8 to 14 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak thick platy structure; friable; common fine roots; many distinct silt coatings on faces of peds; many distinct organic stains on faces of peds and in old root channels; slightly acid; clear smooth boundary.

Bt1—14 to 18 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; firm; many prominent clay films on faces of peds; many distinct silt coatings in pores and on faces of peds; common fine prominent dark yellowish brown (10YR 4/6) redox concentrations; strongly acid; clear smooth boundary.

Bt2—18 to 26 inches; dark brown (10YR 4/3) silty clay; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; many distinct clay films on faces of peds; few faint silt coatings in pores and on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; strongly acid; clear wavy boundary.

Bt3—26 to 33 inches; yellowish brown (10YR 5/4) silty clay; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; very firm; common fine roots; many faint clay films on faces of peds; few medium black concretions of iron and manganese oxides; many fine prominent grayish brown (2.5Y 5/2) redox depletions and common fine prominent yellowish brown (10YR 5/8) redox concentrations; strongly acid; clear wavy boundary.

Btg—33 to 56 inches; grayish brown (10YR 5/2) silty clay loam; weak coarse prismatic structure; firm; few fine roots; few distinct clay films on faces of peds and in root channels; common fine prominent yellowish brown (10YR 5/8) and common medium prominent strong brown (7.5YR 5/8) redox concentrations; few medium black concretions of iron and manganese oxides; moderately acid; clear wavy boundary.

BCg—56 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; weak coarse prismatic structure; firm; many medium prominent yellowish red (5YR 5/8) and reddish yellow (7.5YR 6/8) redox concentrations; common fine black concretions of iron oxide; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 66 inches

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 or 3
Texture—silt loam

Bt horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silty clay

Btg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam or silty clay

BCg horizon or 2BCg horizon (if it occurs):
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—1 to 8
Texture—silty clay loam, clay loam, or silt loam

632B—Adco silt loam, 1 to 5 percent slopes

Composition

Adco and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope range: 1 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1.0 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.8 inches (high)
Content of organic matter in the surface layer: About 3.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

AW—Animal waste

Component Description

- This map unit consists of a shallow pond constructed to hold animal waste from farm feedlots.

Appanoose Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Upland flats
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 2 percent

Typical Pedon

Appanoose silt loam, 0 to 2 percent slopes, 990 feet south and 1,670 feet east of the center of sec. 8, T. 68 N., R. 10 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 04 seconds N. and longitude 92 degrees 01 minute 43 seconds W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

E—9 to 15 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; many distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

BE—15 to 17 inches; dark gray (10YR 4/1) silty clay loam, gray (10YR 6/1) dry; moderate fine subangular blocky structure; friable; few fine roots; common distinct white (10YR 8/1) silt coatings on faces of peds; common fine prominent yellowish brown (10YR 5/4 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Btg1—17 to 27 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; many prominent dark gray (10YR 4/1) and very dark gray (10YR 3/1) organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/4 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—27 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate medium subangular blocky structure; very firm; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many distinct clay films on faces of peds and in pores; many fine prominent yellowish brown (10YR 5/4 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—33 to 40 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many distinct clay films on faces of peds and in pores; many fine and medium prominent yellowish brown (10YR 5/4 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

BCg—40 to 55 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common distinct clay films on faces of peds and in pores; many fine and medium prominent yellowish brown (10YR 5/4 and 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Cg—55 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; massive; friable; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many fine and medium prominent yellowish brown (10YR 5/4 and 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 55 to 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Texture—silt loam

BE horizon:
Hue—10YR or 2.5Y
Value—4
Chroma—1 or 2
Texture—silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 3
Texture—silty clay

BCg horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2
Texture—silty clay or silty clay loam

Cg horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2
Texture—silty clay loam

261—Appanoose silt loam, 0 to 2 percent slopes

Composition

Appanoose and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits

Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

5047—Aquents, ponded, occasionally flooded

Composition

Aquents: Variable

Component Description

Texture of the surface layer: Variable
Depth to bedrock: More than 60 inches
Drainage class: Very poorly drained
Flooding frequency: Occasional
Water table depth: 1 foot above to 1 foot below the surface
Kind of water table: Apparent
Ponding duration: Very long

Additional information specific to this map unit is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- These soils are too variable to be rated for specific uses.

Arispe Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Loess
Native vegetation: Prairie
Slope range: 5 to 9 percent
Taxadjunct features: The Arispe soils in this county do not have a mollic epipedon, which is definitive for the series.

Typical Pedon

Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded, 1,740 feet south and 225 feet east of the northwest corner of sec. 15, T. 70 N., R. 8 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 59 seconds N. and longitude 91 degrees 46 minutes 32 seconds W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; about 30 percent streaks and pockets of dark grayish brown (10YR 4/2) subsoil material; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

BA—9 to 15 inches; dark grayish brown (2.5Y 4/2) and brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; few fine prominent yellowish brown (10YR 5/4) redox concentrations; neutral; clear smooth boundary.

Btg1—15 to 23 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium and coarse subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common fine prominent yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg2—23 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine prominent yellowish brown (10YR 5/4) redox concentrations;

few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg3—33 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam; weak coarse subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; clear smooth boundary.

BCg—43 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure; friable; many medium prominent strong brown (7.5YR 4/6) and common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; clear smooth boundary.

2Eb—50 to 65 inches; gray (5Y 5/1) silty clay loam; weak thick platy structure; friable; common medium and coarse prominent strong brown (7.5YR 4/6) and common medium prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

2Btgb—65 to 80 inches; gray (5Y 5/1) silty clay; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; very few distinct clay films on faces of peds; common medium prominent yellowish brown (10YR 5/6), common fine and medium prominent strong brown (7.5YR 4/6), and common fine prominent strong brown (7.5YR 5/8) redox concentrations; neutral.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam

BA horizon:
Hue—10YR or 2.5Y
Value—4
Chroma—2
Texture—silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 or 3
Texture—silty clay loam or silty clay

BCg horizon:
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

2Eb horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1
Texture—silty clay loam

2Btgb horizon:
Hue—2.5Y or 5Y
Value—4 or 5
Chroma—1
Texture—silty clay or clay

23C2—Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Arispe and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, side slopes, and interfluves
Hillslope position: Footslopes and toeslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 11.7 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Clarinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Armstrong Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over a reddish paleosol weathered from glacial till
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 9 to 14 percent

Typical Pedon

Armstrong clay loam, 9 to 14 percent slopes, moderately eroded, 1,300 feet north and 820 feet west of the southeast corner of sec. 29, T. 68 N., R. 9 W.; USGS Keosauqua, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 25 seconds N. and longitude 91 degrees 54 minutes 47 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; about 20 percent streaks and pockets of brown (7.5YR 4/4) subsoil material; weak very fine and fine granular structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; 1 percent pebbles; slightly acid; abrupt smooth boundary.

Bt1—8 to 12 inches; brown (7.5YR 4/4) clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine distinct reddish brown (5YR 4/4) redox concentrations; 1 percent pebbles; strongly acid; clear smooth boundary.

2Bt2—12 to 18 inches; brown (7.5YR 4/4) clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; common fine prominent yellowish red (5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Bt3—18 to 25 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; very firm; few fine roots; many distinct brown (10YR 5/3) clay films on faces of peds; few fine prominent yellowish red (5YR 4/6) and common fine prominent brown (7.5YR 4/4) redox concentrations and common fine distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Bt4—25 to 36 inches; yellowish brown (10YR 5/6) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few distinct grayish brown (10YR 5/2) and dark gray (10YR 4/1) clay films on faces of peds; few fine prominent brown (7.5YR 4/4) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Bt5—36 to 42 inches; yellowish brown (10YR 5/6) clay loam; weak medium prismatic structure; firm; few fine roots; common prominent brown (7.5YR 4/4) clay films on faces of peds; common fine prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2Bt6—42 to 56 inches; yellowish brown (10YR 5/6) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few prominent brown (7.5YR 4/4) clay films on faces of peds; common fine prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2BC—56 to 69 inches; yellowish brown (10YR 5/6) clay loam; weak medium prismatic structure; firm; few prominent brown (7.5YR 4/4) clay films on faces of peds; many fine prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; clear smooth boundary.

2C—69 to 80 inches; yellowish brown (10YR 5/6) and brown (10YR 5/3) clay loam; massive; firm; common fine and medium prominent light brownish gray (10YR 6/2) and common medium distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; few fine irregular soft masses of lime; slightly effervescent; 1 percent pebbles; moderately alkaline.

Range in Characteristics

Thickness of the solum: 42 to 80 inches
Depth to carbonates: 42 to 80 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—clay loam

Bt horizon:
Hue—7.5YR
Value—4 or 5
Chroma—2 to 4
Texture—clay loam

2Bt horizon:
Hue—7.5YR or 5YR
Value—4 or 5
Chroma—2 to 6
Texture—clay or clay loam

2BC horizon:
Hue—2.5Y or 10YR
Value—4 to 6
Chroma—3 to 6
Texture—clay loam

2C horizon:
Hue—2.5Y or 10YR
Value—4 to 6
Chroma—3 to 6
Texture—clay loam

792D2—Armstrong clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Armstrong and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.5 inches (moderate)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Gara and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

Ashgrove Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess over a gray paleosol weathered from glacial till
Native vegetation: Forest
Slope range: 5 to 14 percent

Typical Pedon

Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded, 2,040 feet north and 200 feet east of the center of sec. 15, T. 70 N., R. 10 W.; USGS Mount Zion, Iowa, Topographic Quadrangle; latitude 40 degrees 52 minutes 9 seconds N. and longitude 92 degrees 59 minutes 44 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; 25 percent streaks and pockets of brown (10YR 4/3) subsoil material; weak very fine and fine granular structure; friable; common very fine and fine roots;

few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 1 percent pebbles; neutral; abrupt smooth boundary.

2Bt—5 to 14 inches; brown (10YR 4/3) silty clay; moderate fine and medium subangular blocky structure; very firm; common very fine and fine roots; common prominent grayish brown (10YR 5/2) clay films on faces of peds and in pores; common fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2Btg1—14 to 21 inches; light brownish gray (2.5Y 6/2) clay; moderate fine and medium subangular blocky structure; very firm; common very fine and fine roots; 5 percent dark grayish brown (10YR 4/2) krotovinas; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common medium prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly acid; gradual smooth boundary.

2Btg2—21 to 28 inches; light brownish gray (2.5Y 6/2) clay; moderate fine and medium subangular blocky structure; very firm; common very fine and fine roots; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common fine prominent strong brown (7.5YR 4/6 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; neutral; gradual smooth boundary.

2Btg3—28 to 41 inches; light brownish gray (2.5Y 6/2) clay; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; very firm; common very fine and fine roots; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; few fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly alkaline; gradual smooth boundary.

2Btg4—41 to 62 inches; light brownish gray (2.5Y 6/2) clay; weak coarse prismatic structure parting to moderate coarse subangular blocky; very firm; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; few fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly alkaline; gradual smooth boundary.

2Cg—62 to 80 inches; light brownish gray (2.5Y 6/2) clay loam; massive; very firm; few fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; neutral.

Range in Characteristics

Thickness of the solum: 42 to more than 80 inches
Content of rock fragments: 1 to 3 percent

Ap or A horizon:
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—silty clay loam

2Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam or silty clay

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 3
Texture—clay

2Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5
Chroma—1 to 6
Texture—clay loam

795C2—Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Ashgrove and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched

Available water capacity to 60 inches or root-limiting layer: About 8.1 inches (moderate)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils
- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

795D—Ashgrove silty clay loam, 9 to 14 percent slopes

Composition

Ashgrove and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.3 inches (moderate)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils
- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

795D2—Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Ashgrove and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.1 inches (moderate)
Content of organic matter in the surface layer: About 2.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils
- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Beckwith Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Upland flats and stream terraces
Parent material: Loess
Native vegetation: Forest
Slope range: 0 to 2 percent

Typical Pedon

Beckwith silt loam, 0 to 2 percent slopes, 100 feet west and 510 feet north of the southeast corner of sec. 5, T. 70 N., R. 8 W.; USGS Lockridge West, Iowa, Topographic Quadrangle; latitude 40 degrees 53 minutes 15 seconds N. and longitude 91 degrees 47 minutes 42 seconds W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

E—5 to 14 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; moderate thin platy structure; friable; few fine roots; common distinct light gray (10YR 7/1) silt coatings on faces of peds; few fine faint yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Btg1—14 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg2—24 to 36 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; many fine prominent yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg3—36 to 54 inches; light brownish gray (2.5Y 6/2) silty clay; weak fine and medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; many fine prominent yellowish brown (10YR 5/6) and common fine prominent yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg4—54 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; many fine prominent yellowish brown (10YR 5/6) and common fine prominent yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 42 to 60 inches

A horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—5 or 6
Chroma—2
Texture—silt loam

Btg horizon (upper part):
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—2
Texture—silty clay or clay

Btg horizon (lower part):
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2
Texture—silty clay loam

260—Beckwith silt loam, 0 to 2 percent slopes

Composition

Beckwith and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

1260—Beckwith silt loam, bench, 0 to 2 percent slopes

Composition

Beckwith and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Belinda Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Upland flats and stream terraces
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 2 percent

Typical Pedon

Belinda silt loam, 0 to 2 percent slopes, 85 feet north and 1,060 feet west of the center of sec. 12, T. 69 N., R. 9 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 52 seconds N. and longitude 91 degrees 50 minutes 49 seconds W.

Ap—0 to 5 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; moderately acid; abrupt smooth boundary.

A—5 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium platy structure parting to weak fine granular; friable; few fine roots; strongly acid; clear smooth boundary.

E—9 to 17 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; common distinct light gray (10YR 6/1) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg1—17 to 29 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores and many prominent clay films on faces of peds; many fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—29 to 39 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many prominent clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—39 to 47 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many distinct clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

BCg—47 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; very few faint clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1
Texture—silt loam

E horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Texture—silt loam

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or clay

Btg horizon (lower part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam

BCg horizon:
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

130—Belinda silt loam, 0 to 2 percent slopes

Composition

Belinda and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 0.5 foot to 2.0 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

1130—Belinda silt loam, bench, 0 to 2 percent slopes

Composition

Belinda and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 0.5 foot to 2.0 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

Bentonsport Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Colluvium over residuum
Native vegetation: Deciduous trees and mixed grasses
Slope range: 25 to 40 percent

Typical Pedon

Bentonsport extremely gravelly loam, in an area of Nordness-Bentonsport complex, 25 to 40 percent slopes, 2,230 feet north and 720 feet west of the southeast corner of sec. 9, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 10 seconds N. and longitude 91 degrees 46 minutes 42 seconds W.

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) extremely gravelly loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; common fine and medium roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; 51 percent pebbles; 5 percent cobbles; 5 percent stones; slightly effervescent; slightly alkaline; clear smooth boundary.

A2—3 to 8 inches; very dark grayish brown (10YR 3/2) very gravelly loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; common fine and medium roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; 31 percent pebbles; 5 percent cobbles; 5 percent stones; slightly effervescent; slightly alkaline; gradual smooth boundary.

A3—8 to 18 inches; very dark grayish brown (10YR 3/2) very gravelly loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; common fine and medium roots; 21 percent pebbles; 15 percent cobbles; 5 percent stones; slightly effervescent; slightly alkaline; clear smooth boundary.

A4—18 to 32 inches; dark brown (10YR 3/3) very cobbly loam; weak very fine and fine subangular blocky structure; friable; few fine and medium roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 15

percent pebbles; 15 percent cobbles; 8 percent stones; slightly effervescent; slightly alkaline; gradual smooth boundary.

Bw—32 to 41 inches; brown (10YR 4/3) extremely cobbly loam; weak fine subangular blocky structure; friable; few fine and medium roots; many distinct very dark grayish brown (10YR 3/2) and common distinct dark brown (10YR 3/3) organic coatings on faces of peds; 17 percent pebbles; 30 percent cobbles; 20 percent stones; slightly effervescent; moderately alkaline; clear smooth boundary.

Bt—41 to 48 inches; yellowish brown (10YR 5/4) extremely gravelly loam; weak fine subangular blocky structure; friable; few fine and medium roots; many distinct brown (10YR 4/3) clay films on faces of peds; very few prominent very dark gray (10YR 3/1) manganese or iron-manganese stains in root channels and pores; 37 percent pebbles; 25 percent cobbles; 8 percent stones; strongly effervescent; moderately alkaline; clear smooth boundary.

C1—48 to 56 inches; yellowish brown (10YR 5/4) very cobbly loam; massive; friable; few fine and medium roots; very few prominent very dark gray (10YR 3/1) manganese or iron-manganese stains in root channels and pores; few distinct brown (10YR 4/3) coatings on faces of peds; 23 percent pebbles; 25 percent cobbles; 8 percent stones; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—56 to 61 inches; yellowish brown (10YR 5/4) very cobbly loam; massive; friable; few fine and medium roots; very few prominent very dark gray (10YR 3/1) manganese or iron-manganese stains in root channels and pores; few distinct brown (7.5YR 4/4) coatings on faces of peds; 8 percent pebbles; 20 percent cobbles; 8 percent stones; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—61 to 70 inches; light yellowish brown (10YR 6/4) very gravelly clay loam; massive; very firm; few fine and medium roots; few fine prominent strong brown (7.5YR 4/6) redox concretions; few prominent very dark gray (10YR 3/1) manganese or iron-manganese stains in root channels and pores; 37 percent pebbles; 10 percent cobbles; violently effervescent; moderately alkaline; clear smooth boundary.

2C4—70 to 75 inches; olive gray (5Y 5/2) and light olive gray (5Y 6/2) gravelly silt loam; massive; very firm; few fine and medium roots; common medium prominent brownish yellow (10YR 6/8) and few fine prominent strong brown (7.5YR 5/8) redox concretions; few prominent very dark gray (10YR 3/1) manganese or iron-manganese stains in root channels and pores; 19 percent pebbles; 4 percent cobbles; strongly effervescent; moderately alkaline; clear smooth boundary.

2Cr—75 to 107 inches; olive gray (5Y 5/2) shale that textures to silty clay loam.

Range in Characteristics

Thickness of the solum: 36 to 60 inches
Thickness of the mollic epipedon: 24 to 36 inches
Carbonates: Throughout the profile
Content of rock fragments: More than 35 percent

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—the very or extremely gravelly or cobbly analogs of loam, silt loam, or silty clay loam

Bw horizon:
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—the very or extremely gravelly or cobbly analogs of loam or clay loam

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—the very or extremely gravelly or cobbly analogs of loam or clay loam

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 to 6
Texture—the very or extremely gravelly or cobbly analogs of loam or clay loam

2Cr horizon:
Hue—7.5YR, 10YR, 2.5Y, 5Y, or N
Value—4 to 6
Chroma—0 to 8
Texture—weathered bedrock material that can be textured to silty clay loam or clay

Bucklick Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands

Parent material: Thin mantle of loess and the underlying limestone residuum
Native vegetation: Forest
Slope range: 18 to 35 percent

Typical Pedon

Bucklick silt loam, 18 to 35 percent slopes, 200 feet west and 200 feet north of the southeast corner of sec. 31, T. 64 N., R. 6 W.; USGS Kahoka, Missouri, Topographic Quadrangle; latitude 40 degrees 17 minutes 40 seconds N. and longitude 91 degrees 35 minutes 18 seconds W.

A—0 to 6 inches; dark yellowish brown (10YR 3/4) silt loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; friable; many fine and many medium roots; strongly acid; clear smooth boundary.
E—6 to 10 inches; brown (7.5YR 5/4) silt loam; weak fine subangular blocky structure; friable; common medium and few fine roots; few prominent silt coatings on faces of peds; common fine distinct strong brown (7.5YR 4/6) redox concentrations; moderately acid; clear wavy boundary.
Bt1—10 to 20 inches; red (2.5YR 4/8) clay loam; weak medium prismatic structure parting to moderate medium angular blocky; firm; few fine and common medium roots; common distinct clay films on faces of peds and in old root channels; very strongly acid; clear wavy boundary.
Bt2—20 to 31 inches; red (2.5YR 4/8) clay loam; moderate coarse prismatic structure parting to moderate medium angular blocky; firm; many medium and few large roots; common distinct clay films on faces of peds and in old root channels; 5 percent chert pebbles; very strongly acid; clear wavy boundary.
Bt3—31 to 40 inches; red (2.5YR 4/8) clay loam; weak coarse prismatic structure parting to strong medium angular blocky; firm; few medium and large roots; common distinct clay films on faces of peds and in old root channels; few fine concretions of iron and manganese oxides; 5 percent chert pebbles; strongly acid; clear wavy boundary.
Bt4—40 to 46 inches; yellowish red (5YR 4/6) clay loam; weak fine subangular blocky structure; firm; few medium and large roots; common distinct clay films on faces of peds and in old root channels; few fine concretions of iron and manganese oxides; 5 percent chert pebbles; strongly acid; clear wavy boundary.
R—46 inches; limestone.

Range in Characteristics

Thickness of the solum: 36 to 60 inches
Depth to bedrock: 40 to 60 inches
Content of rock fragments: 1 to 5 percent

A horizon:
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture—silt loam

E horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 or 4
Texture—silt loam or silty clay loam

Bt horizon:
Hue—2.5YR or 5YR
Value—4 to 6
Chroma—3 to 8
Texture—clay loam

R layer:
Kind of bedrock—hard, fractured limestone

598G—Bucklick silt loam, 18 to 35 percent slopes

Composition

Bucklick and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Side slopes and nose slopes
Hillslope position: Backslopes
Slope range: 18 to 35 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: 40 to 60 inches
Drainage class: Well drained
Dominant parent material: Loess over residuum
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 7.0 inches (moderate)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Nordness and similar soils
- Areas that have loess on the surface

Major Uses of the Unit

- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Bucknell Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Loess over a gray paleosol weathered from glacial till
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 9 to 14 percent

Typical Pedon

Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded, 650 feet west and 500 feet north of the southeast corner of sec. 26, T. 70 N., R. 9 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 49 minutes 46 seconds N. and longitude 91 degrees 51 minutes 19 seconds W.

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; 20 percent streaks and pockets of dark grayish brown (2.5Y 4/2) subsoil material; moderate medium granular structure; friable; few fine roots; moderately acid; abrupt smooth boundary.

2Btg1—5 to 15 inches; dark grayish brown (2.5Y 4/2) clay; common fine distinct strong brown (7.5YR 4/6) redox concentrations; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; 1 percent pebbles; very strongly acid; gradual smooth boundary.

2Btg2—15 to 27 inches; dark grayish brown (2.5Y 4/2) clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; clear smooth boundary.

2BCg—27 to 45 inches; yellowish brown (10YR 5/4) and dark grayish brown (2.5Y 4/2) clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine faint yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; neutral; gradual smooth boundary.

2C—45 to 60 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; few fine roots; many fine and medium prominent grayish brown (2.5Y 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silty clay loam

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2 to 8
Texture—clay loam or clay

2BCg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2 to 8
Texture—clay loam

2C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—3 to 8
Texture—clay loam

423D2—Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Bucknell and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Gara and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Cantril Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains and upland drainageways
Parent material: Loamy alluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 2 to 5 percent

Typical Pedon

Cantril loam, in an area of Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes, 560 feet west and 485 feet north of the southeast corner of sec. 30, T. 69 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 44 minutes 32 seconds N. and longitude 91 degrees 48 minutes 53 seconds W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

E—9 to 16 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; weak medium platy structure parting to weak very fine and fine subangular blocky; friable; few fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; few very dark gray (10YR 3/1) organic coatings on faces of peds; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

BE—16 to 21 inches; grayish brown (10YR 5/2) loam; weak fine subangular blocky structure; friable; few fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; few fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg1—21 to 28 inches; grayish brown (10YR 5/2) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few distinct brown (10YR 5/3) clay films on faces of peds and in pores; few fine prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg2—28 to 34 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; friable; few fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; common fine prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg3—34 to 48 inches; grayish brown (10YR 5/2) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; common fine and medium prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg4—48 to 59 inches; grayish brown (10YR 5/2), brown (7.5YR 4/4), and strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg5—59 to 66 inches; grayish brown (10YR 5/2), brown (7.5YR 4/4), and strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure; friable; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Cg—66 to 80 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay loam; massive; friable; common fine distinct dark yellowish brown (10YR 4/4) and prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid.

Range in Characteristics

Thickness of the solum: 42 to 72 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—loam

E horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture—loam

BE horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture—loam

Btg horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture—clay loam

Cg horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture—clay loam

Carlow Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Carlow silty clay, 0 to 2 percent slopes, occasionally flooded, 750 feet south and 200 feet west of the northeast corner of sec. 26, T. 68 N., R. 11 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 56 seconds N. and longitude 92 degrees 05 minutes 00 seconds W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; firm; few fine roots; many black (10YR 2/1) organic coatings on faces of peds; strongly acid; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; weak fine granular structure; firm; few fine roots; strongly acid; gradual smooth boundary.

Bg1—13 to 20 inches; dark gray (5Y 4/1) silty clay; weak fine subangular blocky structure; very firm; few fine roots; common distinct organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/8) redox concentrations; very strongly acid; gradual smooth boundary.

Bg2—20 to 26 inches; gray (5Y 5/1) silty clay; moderate fine subangular blocky structure; very firm; few fine roots; common distinct pressure faces; common fine prominent yellowish red (5YR 5/6) redox concentrations; very strongly acid; gradual smooth boundary.

Bg3—26 to 34 inches; gray (5Y 5/1) silty clay; moderate medium and coarse subangular blocky

structure; very firm; few fine roots; common distinct pressure faces; common fine prominent yellowish red (5YR 5/8) redox concentrations; strongly acid; gradual smooth boundary.
Bg4—34 to 45 inches; gray (5Y 5/1) silty clay; moderate coarse subangular blocky structure; very firm; few fine roots; common distinct pressure faces; common fine and medium prominent yellowish red (5YR 5/8) redox concentrations; strongly acid; gradual smooth boundary.
Bg5—45 to 60 inches; dark gray (10YR 4/1) silty clay; moderate coarse subangular blocky structure; very firm; few fine roots; common distinct pressure faces; common fine prominent yellowish red (5YR 5/8) redox concentrations; strongly acid.

Range in Characteristics

Thickness of the solum: 30 to more than 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap or A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 to 2
Texture—silty clay

Bg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—4 to 6
Chroma—0 to 2
Texture—silty clay or clay

534—Carlow silty clay, 0 to 2 percent slopes, occasionally flooded

Composition

Carlow and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained (fig. 8)
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 6.6 inches (moderate)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Chequest Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Silty alluvium
Native vegetation: Mixed grasses and deciduous trees
Slope range: 0 to 2 percent

Typical Pedon

Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded, 100 feet north and 1,900 feet east of the southwest corner of sec. 23, T. 70 N., R. 11 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 50 minutes 33 seconds N. and longitude 92 degrees 5 minutes 45 seconds W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.
A—8 to 11 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine angular blocky structure parting to moderate very fine and fine granular; friable; common very fine and fine roots; strongly acid; clear smooth boundary.
Btg1—11 to 18 inches; dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; friable; common very fine and fine roots; common distinct gray (10YR 5/1) clay films on faces of

Figure 8.—An area of Carlow silty clay, 0 to 2 percent slopes, occasionally flooded. This poorly drained soil is on a large, nearly level flood plain. The Fox River is behind the trees in the background.

peds and in pores; common fine distinct yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg2—18 to 34 inches; dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; common very fine and fine roots; common distinct gray (10YR 5/1) clay films on faces of peds and in pores; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—34 to 51 inches; dark gray (10YR 4/1) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; common very fine and fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds and in pores; many distinct black (10YR 2/1) organic coatings on faces of peds; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg4—51 to 62 inches; dark gray (10YR 4/1) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine and fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds and in pores; common distinct black (10YR 2/1) organic coatings on faces of peds; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Btg5—62 to 69 inches; gray (10YR 5/1) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common distinct dark gray (10YR 4/1) clay films on faces of peds and in pores; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common fine and medium prominent strong brown (7.5YR 5/6) redox concentrations; common fine prominent grayish brown (2.5Y 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Cg—69 to 80 inches; grayish brown (2.5Y 5/2) silty clay; massive; firm; common fine and medium prominent strong brown (7.5YR 4/6 and 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to 70 inches
Thickness of the mollic epipedon: 10 to 18 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silty clay loam

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1
Texture—silty clay loam or silty clay

Cg horizon:
Hue—7.5YR, 10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay

3587—Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded

Composition

Chequest and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Clarinda Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess over a gray paleosol weathered from glacial till
Native vegetation: Prairie
Slope range: 5 to 9 percent
Taxadjunct features: The Clarinda soils in this county are taxadjuncts because the dark surface layer is too thin to qualify as a mollic epipedon.

Typical Pedon

Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded, 2,390 feet south and 800 feet east of the northwest corner of sec. 15, T. 70 N., R. 8 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 54 seconds N. and longitude 91 degrees 46 minutes 23 seconds W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; common streaks and pockets of dark grayish brown (10YR 4/2) subsurface material; weak very fine and fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Btg1—6 to 12 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate very fine and fine subangular blocky structure; friable; few fine roots; few distinct very dark gray (10YR 3/1) coatings on faces of peds; many prominent clay films on faces of peds; few fine prominent brown (10YR 5/3) redox concentrations; strongly acid; clear smooth boundary.

2Btg2—12 to 17 inches; gray (10YR 5/1) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine prominent brown (10YR 5/3) and strong brown (7.5YR 5/6) redox concentrations; strongly acid; gradual smooth boundary.

2Btg3—17 to 35 inches; gray (5Y 5/1) clay; moderate medium and coarse subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine prominent yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) redox concentrations; slightly acid; gradual smooth boundary.

2Btg4—35 to 47 inches; gray (5Y 5/1) clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; common distinct clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few medium and coarse irregular lime concretions; 1 percent pebbles; neutral; gradual smooth boundary.

2Btg5—47 to 70 inches; dark gray (5Y 4/1) clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; common distinct clay films on faces of peds; common fine prominent yellowish brown (10YR 5/4) and few fine prominent brown (7.5YR 4/4) redox concentrations; few medium and coarse irregular lime concretions; 1 percent pebbles; neutral; gradual smooth boundary.

2Cg—70 to 80 inches; gray (10YR 5/1) clay loam; massive; very firm; many medium and coarse prominent strong brown (7.5YR 4/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; few medium and coarse irregular lime concretions; 1 percent pebbles; neutral.

Range in Characteristics

Thickness of the solum: 66 to 76 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silty clay loam

Btg horizon:
Hue—10YR
Value—4
Chroma—2
Texture—silty clay loam

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1
Texture—silty clay or clay

2Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1
Texture—clay loam

222C2—Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Clarinda and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Clinton Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Uplands and stream terraces
Parent material: Loess
Native vegetation: Forest
Slope range: 2 to 14 percent

Typical Pedon

Clinton silt loam, 5 to 9 percent slopes, 800 feet south and 60 feet east of the northwest corner of sec. 25, T. 68 N., R. 8 W.; USGS Farmington, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 55 seconds N. and longitude 91 degrees 44 minutes 13 seconds W.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; common very fine and fine roots; neutral; clear smooth boundary.

E—4 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium platy structure; friable; common very fine and fine roots; slightly acid; clear smooth boundary.

BE—8 to 12 inches; brown (10YR 4/3) silty clay loam; weak very thick platy structure parting to moderate fine and medium subangular blocky; friable; common very fine and fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few distinct dark brown (10YR 3/3) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds and in pores; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Bt2—18 to 25 inches; yellowish brown (10YR 5/4) silty clay; strong fine and medium subangular blocky structure; firm; common very fine and fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds and in pores; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Bt3—25 to 33 inches; dark yellowish brown (10YR 4/4) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common very fine and fine roots; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Bt4—33 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable; common very fine and fine roots; common distinct brown (10YR 5/3) clay films on faces of peds and in pores; few fine prominent yellowish red (5YR 4/6) redox concentrations; common fine and medium distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt5—46 to 60 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure; friable; common very fine and fine roots; few distinct brown (10YR 5/3) clay films on faces of peds and in pores; common fine and medium distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt6—60 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure; friable; few distinct clay films on faces of peds and in pores; few fine prominent reddish brown (5YR 4/4) redox concentrations; few fine and medium distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 42 to more than 80 inches

A or Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—silt loam or silty clay loam

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silt loam

BE horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam

Bt horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silty clay

80B—Clinton silt loam, 2 to 5 percent slopes

Composition

Clinton and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

80C—Clinton silt loam, 5 to 9 percent slopes

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

80C2—Clinton silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Clinton and similar soils: About 90 percent

Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.2 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

80D—Clinton silt loam, 9 to 14 percent slopes

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

80D2—Clinton silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches

Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.2 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

880B—Clinton silt loam, bench, 2 to 5 percent slopes

Composition

Clinton and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

880C—Clinton silt loam, bench, 5 to 9 percent slopes

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

880C2—Clinton silty clay loam, bench, 5 to 9 percent slopes, moderately eroded

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.2 inches (high)
Content of organic matter in the surface layer: About 2.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

880D—Clinton silt loam, bench, 9 to 14 percent slopes

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.3 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

880D2—Clinton silty clay loam, bench, 9 to 14 percent slopes, moderately eroded

Composition

Clinton and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.2 inches (high)
Content of organic matter in the surface layer: About 2.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Colo Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Colo silty clay loam, 0 to 2 percent slopes, rarely flooded, 1,340 feet north and 60 feet east of the center of sec. 7, T. 70 N., R. 11 W.; USGS Eldon, Iowa, Topographic Quadrangle; latitude 40 degrees 52 minutes 57 seconds N. and longitude 92 degrees 10 minutes 07 seconds W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few very fine roots; neutral; clear smooth boundary.

A1—9 to 20 inches; black (N 2/0) silty clay loam, dark gray (N 4/0) dry; weak fine subangular blocky structure; friable; few very fine roots; slightly acid; gradual smooth boundary.

A2—20 to 31 inches; black (10YR 2/1) silty clay loam, dark gray (N 4/0) dry; weak fine subangular blocky structure; friable; few very fine roots; many faint black (N 2/0) organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; slightly acid; gradual smooth boundary.

Bg1—31 to 44 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to weak fine and medium angular blocky; friable; few very fine roots; many faint black (10YR 2/1) organic coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; slightly acid; diffuse smooth boundary.

Bg2—44 to 63 inches; very dark gray (10YR 3/1) silty clay loam, gray (5Y 5/1) dry; moderate coarse prismatic structure parting to weak fine and medium subangular blocky; firm; few very fine roots; common fine prominent yellowish brown (10YR 5/6) redox concentrations; slightly acid; diffuse smooth boundary.

BCg—63 to 80 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium and coarse prismatic structure; friable; few very fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels; many fine prominent yellowish brown (10YR 5/6) redox concentrations; neutral.

Range in Characteristics

Thickness of the solum: 36 to more than 80 inches
Thickness of the mollic epipedon: More than 36 inches

Ap horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam

A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam

Bg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—2 or 3
Chroma—1
Texture—silty clay loam

BCg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam

3133—Colo silty clay loam, 0 to 2 percent slopes, rarely flooded

Composition

Colo and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.0 inches (high)
Content of organic matter in the surface layer: About 6 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Coppock Series

Depth class: Very deep
Drainage class: Somewhat poorly drained and poorly drained
Permeability: Moderate
Landform: Flood plains, alluvial fans, and upland drainageways
Parent material: Silty alluvium
Native vegetation: Mixed grasses and deciduous trees
Slope range: 0 to 5 percent

Typical Pedon

Coppock silt loam, 2 to 5 percent slopes, rarely flooded, 2,040 feet south and 195 feet east of the northwest corner of sec. 12, T. 67 N., R. 10 W.; USGS Mount Sterling, Iowa, Topographic Quadrangle; latitude 40 degrees 37 minutes 03 seconds N. and longitude 91 degrees 58 minutes 00 seconds W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak very fine and fine granular structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; moderately acid; abrupt smooth boundary.

E1—9 to 16 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few distinct light gray (10YR 7/1) silt coatings on faces of peds and in pores; few fine prominent strong brown (7.5YR 5/6) redox concentrations; moderately acid; clear smooth boundary.

E2—16 to 25 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium subangular blocky structure; friable; few fine roots; many distinct dark gray (10YR 4/1) coatings on faces of peds; common distinct light gray (10YR 7/1) silt coatings on faces of peds and in pores; few fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Btg1—25 to 32 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; very few distinct light gray (10YR 7/1) silt coatings on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—32 to 37 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg3—37 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few distinct dark gray (10YR 4/1) clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg4—48 to 59 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; very few distinct dark gray (10YR 4/1) clay films in root channels and pores; many fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Cg—59 to 80 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silty clay loam; massive; friable; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Texture—silt loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

Cg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—silty clay loam

520—Coppock silt loam, 0 to 2 percent slopes, occasionally flooded

Composition

Coppock and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

520B—Coppock silt loam, 2 to 5 percent slopes, rarely flooded

Composition

Coppock and similar soils: 100 percent

Setting

Landform: Alluvial fans
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

3520—Coppock silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Coppock and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Creal Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Flood plains and alluvial fans
Parent material: Silty alluvium
Native vegetation: Deciduous trees
Slope range: 2 to 5 percent

Typical Pedon

Creal silt loam, 2 to 5 percent slopes, rarely flooded, 1,450 feet east and 800 feet south of the northwest corner of sec. 26, T. 69 N., R. 10 W.; USGS Mount Zion, Iowa, Topographic Quadrangle; latitude 40 degrees 45 minutes 8 seconds N. and longitude 91 degrees 58 minutes 55 seconds W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine and fine granular structure; friable; few fine roots; few fine tubular pores; moderately acid; abrupt smooth boundary.

E1—9 to 16 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak medium platy structure; friable; few fine roots; few fine tubular pores; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; moderately acid; clear smooth boundary.

E2—16 to 30 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate thick platy structure; friable; few fine roots; few fine tubular pores; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; few fine prominent strong brown (7.5YR 4/6) redox concentrations; moderately acid; clear smooth boundary.

Bt1—30 to 37 inches; brown (10YR 4/3) silty clay loam; moderate coarse subangular blocky structure; firm; few fine roots; few fine tubular pores; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; very few prominent gray (10YR 5/1) clay films in root channels and pores; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; common fine prominent strong brown (7.5YR 4/6) redox concentrations; strongly acid; gradual smooth boundary.

Bt2—37 to 47 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; few fine tubular pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few prominent gray (10YR 5/1) clay films in root channels and pores; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; common fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg1—47 to 72 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure; firm; few fine roots; few fine tubular pores; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few prominent gray (10YR 5/1) clay films in root channels and pores; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds and in pores; many fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg2—72 to 80 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium prismatic structure; firm; few fine roots; few fine tubular pores; common distinct grayish brown (10YR 5/2) clay films on faces of peds and in pores; many fine and medium prominent strong brown (7.5YR 4/6) redox concentrations; few fine irregular soft masses of iron-manganese; very strongly acid.

Range in Characteristics

Thickness of the solum: 60 to more than 80 inches

Ap horizon:
Hue—10YR
Value—4
Chroma—2 or 3
Texture—silt loam

E horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture—silt loam

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—3 or 4
Texture—silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silty clay loam

BCg or 2BCg horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silty clay loam or silt loam

719B—Creal silt loam, 2 to 5 percent slopes, rarely flooded

Composition

Creal and similar soils: 100 percent

Setting

Landform: Flood plains and alluvial fans
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3.0 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

Douds Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Old valley alluvium
Native vegetation: Forest
Slope range: 9 to 40 percent

Typical Pedon

Douds loam, 9 to 14 percent slopes, 100 feet west and 1,360 feet south of the northeast corner of sec. 4, T. 70 N., R. 8 W.; USGS Lockridge West, Iowa, Topographic Quadrangle; latitude 40 degrees 53 minutes 49 seconds N. and longitude 91 degrees 46 minutes 35 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.

E—5 to 10 inches; brown (10YR 4/3) loam, grayish brown (10YR 5/2) dry; weak thin platy structure; friable; common very fine roots; common faint dark grayish brown (10YR 4/2) coatings on faces of peds and in pores; moderately acid; abrupt smooth boundary.

Bt1—10 to 14 inches; dark yellowish brown (10YR 4/4) loam; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common distinct light gray (10YR 6/1) silt coatings on horizontal faces of peds; moderately acid; abrupt smooth boundary.

Bt2—14 to 24 inches; dark yellowish brown (10YR 4/4) loam; moderate very fine and fine subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; very strongly acid; clear smooth boundary.

Bt3—24 to 32 inches; dark yellowish brown (10YR 4/4) loam; moderate medium and coarse subangular blocky structure; friable; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common fine and medium prominent yellowish red (5YR 5/8) redox concentrations; very strongly acid; gradual smooth boundary.

Bt4—32 to 44 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium prismatic structure parting to weak medium and coarse subangular blocky; friable; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few fine prominent yellowish red (5YR 5/8) and common fine and medium prominent yellowish brown (10YR 5/8) redox concentrations; many medium and coarse prominent light brownish gray (2.5Y 6/2) redox depletions; very strongly acid; gradual smooth boundary.

BC—44 to 54 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium and coarse subangular blocky structure; firm; common fine distinct yellowish brown (10YR 5/8) and few fine prominent yellowish red (5YR 4/6) redox concentrations; many fine and medium prominent light brownish gray (2.5Y 6/2) redox depletions; very strongly acid; gradual smooth boundary.

C1—54 to 70 inches; yellowish brown (10YR 5/6) sandy loam; massive; friable; common fine prominent yellowish red (5YR 5/8) redox concentrations; common fine prominent light brownish gray (2.5Y 6/2) redox depletions; few fine prominent black stains; moderately acid; gradual smooth boundary.

C2—70 to 80 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable; few medium prominent pale brown (10YR 6/3) redox concentrations; few fine prominent black stains; moderately acid.

Range in Characteristics

Thickness of the solum: 36 to 72 inches

Ap or A horizon:
Hue—10YR
Value—3 to 5
Chroma—1 to 3
Texture—loam

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—silt loam or loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture—loam, clay loam, sandy clay loam, or sandy loam

BC horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture—loam, clay loam, sandy clay loam, sandy loam, or loamy sand

C horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture—loam, clay loam, sandy clay loam, sandy loam, or loamy sand

58D—Douds loam, 9 to 14 percent slopes

Composition

Douds and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

58D2—Douds loam, 9 to 14 percent slopes, moderately eroded

Composition

Douds and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.2 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

58E2—Douds loam, 14 to 18 percent slopes, moderately eroded

Composition

Douds and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.2 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

58F2—Douds loam, 18 to 25 percent slopes, moderately eroded

Composition

Douds and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 18 to 25 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.1 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

58G—Douds loam, 25 to 40 percent slopes

Composition

Douds and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 25 to 40 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.0 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Edina Series

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Very slow
Landform: Upland flats and upland depressions
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Edina silt loam, 0 to 2 percent slopes, 1,850 feet south and 1,450 feet west of the northeast corner of sec. 27, T. 68 N., R. 9 W.; USGS Keosauqua, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 46 seconds N. and longitude 91 degrees 52 minutes 40 seconds W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

A—6 to 13 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak thin platy structure parting to weak fine granular; friable; few fine roots; few distinct light gray (10YR 6/1) silt coatings on faces of peds; moderately acid; clear smooth boundary.

E—13 to 19 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; many distinct light gray (10YR 7/1) silt coatings on faces of peds; moderately acid; clear smooth boundary.

Btg1—19 to 23 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/8) and few fine distinct yellowish brown (10YR 5/4) redox concentrations; moderately acid; clear smooth boundary.

Btg2—23 to 30 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—30 to 43 inches; grayish brown (2.5Y 5/2) silty clay; weak medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; common fine prominent brown (7.5YR 4/4) and yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—43 to 56 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common prominent clay films in root channels and pores; common fine and medium prominent yellowish brown (10YR 5/8 and 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Cg—56 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; massive; firm; few fine roots; common fine and medium prominent yellowish brown (10YR 5/8 and 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 or 5
Chroma—1 or 2
Texture—silt loam

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1
Texture—clay or silty clay

Btg horizon (lower part):
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5
Chroma—1 or 2
Texture—clay, silty clay, or silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam

211—Edina silt loam, depressional, 0 to 1 percent slopes

Composition

Edina and similar soils: 100 percent

Setting

Landform: Upland depressions
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 1 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Very poorly drained
Dominant parent material: Loess
Flooding: None
Water table depth: 0.5 foot above to 1.0 foot below the surface
Kind of water table: Apparent
Ponding duration: Long
Available water capacity to 60 inches or root-limiting layer: About 10.4 inches (high)
Content of organic matter in the surface layer: About 4 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

231—Edina silt loam, 0 to 2 percent slopes

Composition

Edina and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides

Hillslope position: Summits
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.4 inches (high)
Content of organic matter in the surface layer: About 4 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Galland Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Stream terraces
Parent material: Pedisediments over paleosols weathered from glacial till
Native vegetation: Forest
Slope range: 9 to 18 percent

Typical Pedon

Galland loam, 9 to 14 percent slopes, moderately eroded, 1,080 feet west and 955 feet south of the center of sec. 13, T. 70 N., R. 8 W.; USGS Hillsboro, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 43 seconds N. and longitude 91 degrees 43 minutes 55 seconds W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; 30 percent streaks and pockets of brown (10YR 4/3) and dark yellowish brown (10YR 4/4) subsoil material; weak fine granular structure; friable; common fine roots; few distinct light gray (10YR 7/1) silt coatings on faces of peds and in pores; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately acid; abrupt smooth boundary.

Bt1—9 to 16 inches; dark yellowish brown (10YR 4/4) clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; common faint clay films on faces of peds; very few faint light gray (10YR 7/1) silt coatings on faces of peds and in pores; few fine prominent grayish brown (10YR 5/2) redox depletions; 1 percent pebbles; very strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; brown (7.5YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; many distinct clay films on faces of peds; common fine and medium prominent yellowish red (5YR 4/6) and common fine prominent red (2.5YR 4/8) redox concentrations; common fine prominent grayish brown (2.5Y 5/2) redox depletions; 1 percent pebbles; very strongly acid; gradual smooth boundary.

Bt3—24 to 33 inches; strong brown (7.5YR 5/6) clay; moderate medium and coarse subangular blocky structure; firm; common fine roots; many prominent clay films on faces of peds; common fine and medium prominent yellowish red (5YR 4/6), many fine and medium prominent yellowish red (5YR 5/8), and common fine prominent red (2.5YR 4/8) redox concentrations; common fine prominent grayish brown (2.5Y 5/2) redox depletions; 1 percent pebbles; very strongly acid; gradual smooth boundary.

BC—33 to 46 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; few fine and medium prominent yellowish red (5YR 4/6) and many fine and medium distinct strong brown (7.5YR 5/6) redox concentrations; common fine and medium prominent grayish brown (2.5Y 5/2) redox depletions; 1 percent pebbles; very strongly acid; gradual smooth boundary.

C—46 to 60 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; common fine and medium distinct strong brown (7.5YR 5/6) redox concentrations; common fine and medium prominent gray (10YR 6/1) redox depletions; 1 percent pebbles; very strongly acid.

Range in Characteristics

Thickness of the solum: 36 to 72 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—loam

Bt horizon:
Hue—10YR, 7.5YR, or 5YR
Value—3 to 5
Chroma—2 to 6
Texture—clay loam, clay, or silty clay

C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—2 to 8
Texture—loam or clay loam

594D2—Galland loam, 9 to 14 percent slopes, moderately eroded

Composition

Galland and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over paleosols weathered from till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

994D2—Galland-Douds complex, 9 to 14 percent slopes, moderately eroded

Composition

Galland and similar soils: About 65 percent
Douds and similar soils: About 35 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Galland

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over paleosols weathered from till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Douds

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

994E2—Galland-Douds complex, 14 to 18 percent slopes, moderately eroded

Composition

Galland and similar soils: About 65 percent
Douds and similar soils: About 35 percent

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Galland

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over paleosols weathered from till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Douds

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium
Flooding: None
Depth to the water table: 4 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Gara Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Glacial till
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 9 to 18 percent

Typical Pedon

Gara clay loam, 9 to 14 percent slopes, moderately eroded, 2,035 feet east and 350 feet south of the center of sec. 23, T. 70 N., R. 9 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 18 seconds N. and longitude 91 degrees 50 minutes 56 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; about 20 percent streaks and pockets of brown (10YR 4/3) subsoil material; moderate fine granular structure; friable; few fine roots; 1 percent pebbles; moderately acid; abrupt smooth boundary.

Bt1—7 to 14 inches; brown (10YR 4/3) clay loam; moderate fine subangular blocky structure parting to weak fine granular; friable; few fine roots; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 1 percent pebbles; moderately acid; clear smooth boundary.

Bt2—14 to 21 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable; few fine roots; many faint clay films on faces of peds; 1 percent pebbles; strongly acid; clear smooth boundary.

Bt3—21 to 34 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; common fine distinct yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

Bt4—34 to 47 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; common fine faint yellowish brown (10YR 5/8) redox concentrations; common fine and medium prominent light brownish gray (10YR 6/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

C—47 to 60 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; few fine roots; common fine and medium prominent light brownish gray (10YR 6/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 30 to 60 inches
Depth to carbonates: 30 to 60 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—clay loam

C horizon:
Hue—10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay loam

179D2—Gara clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Gara and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Armstrong and similar soils
- Rinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

179E2—Gara clay loam, 14 to 18 percent slopes, moderately eroded

Composition

Gara and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Armstrong and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

993D2—Gara-Armstrong complex, 9 to 14 percent slopes, moderately eroded

Composition

Gara and similar soils: About 60 percent
Armstrong and similar soils: About 30 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Gara

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Armstrong

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.5 inches (moderate)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Rinda and similar soils
- Pershing and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Gorin Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over a reddish paleosol weathered from glacial till
Native vegetation: Forest
Slope range: 3 to 14 percent

Typical Pedon

Gorin silt loam, 9 to 14 percent slopes, 1,440 feet north and 660 feet east of the southwest corner of sec. 14, T. 70 N., R. 10 W.; USGS Mount Zion, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 37 seconds N. and longitude 91 degrees 59 minutes 04 seconds W.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

BE—5 to 9 inches; yellowish brown (10YR 5/6) silt loam; weak very fine subangular blocky structure; friable; few fine roots; many prominent silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—9 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine and fine angular blocky structure; firm; few fine roots; many prominent silt coatings on faces of peds; few distinct clay films on faces of peds; common fine distinct grayish brown (10YR 5/2) redox depletions; very strongly acid; clear smooth boundary.

Bt2—14 to 24 inches; yellowish brown (10YR 5/4) silty clay; moderate medium and coarse subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) redox concentrations; common fine distinct grayish brown (10YR 5/2) redox depletions; very strongly acid; gradual smooth boundary.

Bt3—24 to 37 inches; yellowish brown (10YR 5/4) silty clay; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; many prominent clay films on faces of peds and in pores; few distinct silt coatings on faces of peds; few fine distinct yellowish brown (10YR 5/6) redox concentrations; many fine distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

2Bt4—37 to 46 inches; strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; few prominent clay films on faces of peds; few fine prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Bt5—46 to 59 inches; strong brown (7.5YR 5/6) clay loam; weak coarse subangular blocky structure; firm; common fine prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

2C—59 to 80 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; common medium distinct grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 48 to 60 inches

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—silt loam or silty clay loam

BE horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silt loam or silty clay loam

Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay loam or silty clay

2Bt horizon:
Hue—10YR or 7.5YR
Value—5

Chroma—3 to 6
Texture—clay loam

2C horizon:
Hue—10YR
Value—5
Chroma—3 to 6
Texture—clay loam

432C2—Gorin silty clay loam, 3 to 9 percent slopes, moderately eroded

Composition

Gorin and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 3 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1.5 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

432D—Gorin silt loam, 9 to 14 percent slopes

Composition

Gorin and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1.5 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

432D2—Gorin silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Gorin and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1.5 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Gosport Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Very slow
Landform: Uplands
Parent material: Pedisediments over weathered shale
Native vegetation: Forest
Slope range: 9 to 40 percent

Typical Pedon

Gosport silty clay loam, 18 to 25 percent slopes, moderately eroded, 2,460 feet north and 820 feet east of the southwest corner of sec. 22, T. 70 N., R. 10 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 50 minutes 56 seconds N. and longitude 92 degrees 00 minutes 12 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam, pale brown (10YR 6/3) dry; about 20 percent streaks and pockets of dark yellowish brown (10YR 4/6) subsoil material; weak fine granular structure; friable; few fine roots; moderately acid; abrupt smooth boundary.

2Bt1—5 to 14 inches; dark yellowish brown (10YR 4/6) silty clay; moderate and strong very fine and fine subangular blocky structure; firm; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine shale fragments; very strongly acid; clear smooth boundary.

2Bt2—14 to 23 inches; yellowish brown (10YR 5/4) clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many distinct brown (10YR 5/3) clay films on faces of peds; few fine prominent dark brown (7.5YR 3/4) and many fine prominent strong brown (7.5YR 4/6) redox concentrations; many fine distinct gray (10YR 5/1) redox depletions; common fine shale fragments; very strongly acid; gradual smooth boundary.

2Cr—23 to 80 inches; clay shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to material weathered from shale: 3 to 15 inches
Content of rock fragments: 1 to 3 percent

Ap or A horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—silty clay loam

2Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—3 or 4
Texture—silty clay or clay

313D2—Gosport silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Gosport and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over weathered shale
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 3.6 inches (low)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Limestone bedrock

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

313E2—Gosport silty clay loam, 14 to 18 percent slopes, moderately eroded

Composition

Gosport and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over weathered shale
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 3.4 inches (low)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Limestone bedrock

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

313F2—Gosport silty clay loam, 18 to 25 percent slopes, moderately eroded

Composition

Gosport and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 18 to 25 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over weathered shale
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 3.1 inches (low)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Limestone bedrock

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

313G—Gosport silt loam, 25 to 40 percent slopes

Composition

Gosport and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 25 to 40 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over weathered shale
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 3.3 inches (low)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Limestone bedrock

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Grundy Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Loess
Native vegetation: Prairie
Slope range: 2 to 5 percent

Typical Pedon

Grundy silt loam, 2 to 5 percent slopes, 1,975 feet east and 50 feet south of the center of sec. 18, T. 70 N., R. 8 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 52 seconds N. and longitude 91 degrees 48 minutes 54 seconds W.

Ap—0 to 5 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

A1—5 to 11 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few fine roots; neutral; clear smooth boundary.

A2—11 to 16 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

BA—16 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam, gray (10YR 5/1) dry; weak very fine subangular blocky structure parting to weak fine granular; firm; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg1—20 to 28 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—28 to 40 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; many prominent clay films on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—40 to 51 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common prominent clay films on faces of peds and in pores; common fine and medium prominent strong brown (7.5YR 5/6) and common fine prominent yellowish red (5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Cg—51 to 60 inches; light olive gray (5Y 6/2) silty clay loam; massive; firm; very few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; common fine and medium prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 11 to 24 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam

BA horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 or 2
Texture—silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 to 3
Texture—silty clay or silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

364B—Grundy silt loam, 2 to 5 percent slopes

Composition

Grundy and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1.0 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

364B2—Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

Grundy and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1.0 to 2.5 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.0 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Haig Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Upland flats
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Haig silt loam, 0 to 2 percent slopes, 125 feet east and 90 feet north of the center of sec. 17, T. 70 N., R. 8 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 52 seconds N. and longitude 91 degrees 48 minutes 13 seconds W.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak very fine and fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

A—9 to 12 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; few fine roots; neutral; clear smooth boundary.

BA—12 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Bt—16 to 20 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; few fine roots; many prominent black (N 2/0) organic coatings on faces of peds; common black (10YR 2/1) clay films on faces of peds and in pores; moderately acid; clear smooth boundary.

Btg1—20 to 27 inches; dark gray (5Y 4/1) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many prominent clay films on faces of peds and in pores; common fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

Btg2—27 to 32 inches; gray (5Y 5/1) silty clay; weak fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark gray

(10YR 3/1) organic coatings in root channels and pores; many distinct clay films on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg3—32 to 46 inches; gray (5Y 5/1) and olive gray (5Y 5/2) silty clay; weak fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels and pores; common distinct clay films on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—46 to 51 inches; light olive gray (5Y 6/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels and pores; common distinct clay films on faces of peds and in pores; many fine and medium prominent yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg5—51 to 60 inches; light olive gray (5Y 6/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct clay films on faces of peds and in pores; many fine and medium prominent yellowish brown (10YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 52 to more than 60 inches
Thickness of the mollic epipedon: 20 to 23 inches

Ap and A horizons:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silt loam or silty clay loam

BA horizon:
Hue—10YR
Value—2 or 3
Chroma—1
Texture—silty clay loam or silty clay

Bt horizon:
Hue—10YR or 2.5Y
Value—3
Chroma—1
Texture—silty clay

Btg horizon (upper part):
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay

Btg horizon (lower part):
Hue—2.5Y or 5Y

362—Haig silt loam, 0 to 2 percent slopes

Composition

Haig and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1 to 2 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 4 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland (fig. 9)
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Figure 9.—No-till soybeans in an area of Haig silt loam, 0 to 2 percent slopes. The soybeans were planted in the previous year's cornstalks.

363—Haig silty clay loam, 0 to 1 percent slopes

Composition

Haig and similar soils: 100 percent

Setting

Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope range: 0 to 1 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1 to 2 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.1 inches (high)

Content of organic matter in the surface layer: About 4.5 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section

Hoopeston Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid
Landform: Stream terraces
Parent material: Stratified alluvium
Native vegetation: Prairie grasses
Slope range: 0 to 2 percent

Typical Pedon

Hoopeston sandy loam, 0 to 2 percent slopes, 1,870 feet west and 140 feet north of the southeast corner of sec. 26, T. 68 N., R. 8 W.; USGS Farmington, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 13 seconds N. and longitude 91 degrees 44 minutes 37 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) sandy loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; very friable; few fine roots; neutral; abrupt smooth boundary.

A—7 to 13 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; very friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine faint dark brown (10YR 3/3) redox concentrations; slightly acid; clear smooth boundary.

Bw1—13 to 19 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine subangular blocky structure; very friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine faint brown (10YR 4/3) redox concentrations; moderately acid; gradual smooth boundary.

Bw2—19 to 30 inches; brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common fine and medium dark grayish brown (10YR 4/2) coatings on faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; strongly acid; clear smooth boundary.

C1—30 to 42 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) loamy sand; single grain; loose; common fine distinct dark yellowish brown (10YR 4/4) and few fine prominent brown (7.5YR 4/4) redox concentrations; strongly acid; clear smooth boundary.

2C2—42 to 66 inches; grayish brown (2.5Y 5/2) and gray (10YR 5/1) silt loam; massive; friable; common fine prominent yellowish brown (10YR 5/6), few fine prominent brown (7.5YR 4/4), and common fine and medium prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

2C3—66 to 80 inches; stratified yellowish brown (10YR 5/4 and 5/6) and grayish brown (10YR 5/2) silt loam, yellowish brown (10YR 5/6) loamy sand, brown (10YR 4/3) and yellowish brown (10YR 5/4) loam, and pale brown (10YR 6/3) and yellowish brown (10YR 5/4 and 5/6) fine and medium sand; massive; friable; few fine black irregular soft masses of iron-manganese; strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 54 inches
Thickness of the mollic epipedon: 10 to 24 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—sandy loam

Bw horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—1 to 6
Texture—fine sandy loam or sandy loam

C and 2C horizons:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 6
Chroma—1 to 8
Texture—loamy fine sand, loamy sand, fine sand, or sand

173—Hoopeston sandy loam, 0 to 2 percent slopes

Composition

Hoopeston and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Sandy loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Stratified alluvium
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 6.5 inches (moderate)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Keosauqua Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Stratified alluvium
Native vegetation: Prairie
Slope range: 1 to 3 percent

Typical Pedon

Keosauqua loam, 1 to 3 percent slopes, 800 feet east and 1,100 feet south of the northwest corner of sec. 22, T. 70 N., R. 11 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 15 seconds N. and longitude 92 degrees 07 minutes 06 seconds W.

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

A—7 to 13 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—13 to 22 inches; brown (10YR 4/3) loam; moderate very fine and fine angular blocky structure; friable; few fine roots; many faint dark brown (10YR 3/3) organic coatings on faces of peds and in pores; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—22 to 34 inches; dark yellowish brown (10YR 4/4) clay loam; moderate very fine and fine angular blocky structure; friable; few fine roots; many faint dark yellowish brown (10YR 3/4) coatings on faces of peds and in pores; many distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3—34 to 41 inches; dark yellowish brown (10YR 4/6) loam; moderate fine and medium angular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt4—41 to 50 inches; dark yellowish brown (10YR 4/6) loam; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few fine roots; few faint clay films on faces of peds; slightly acid; clear smooth boundary.

2C1—50 to 62 inches; dark yellowish brown (10YR 4/6) loamy sand; single grain; loose; 1 percent pebbles; slightly acid; gradual smooth boundary.

2C2—62 to 80 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; 5 percent pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—loam

Bt horizon:
Hue—10YR or 7.5YR

Value—3 to 5
Chroma—3 to 6
Texture—loam, clay loam, or silt loam

2C horizon:
Hue—10YR or 7.5YR
Value—4 to 8
Chroma—2 to 6
Texture—loamy sand, loamy fine sand, or sand

1977—Keosauqua loam, 1 to 3 percent slopes

Composition

Keosauqua and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 1 to 3 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Stratified alluvium
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 11.4 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Keswick Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over a reddish paleosol weathered from glacial till
Native vegetation: Forest
Slope range: 9 to 18 percent

Typical Pedon

Keswick loam, 9 to 14 percent slopes, 2,300 feet south and 1,360 feet west of the northeast corner of sec. 29, T. 70 N., R. 10 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 50 minutes 07 seconds N. and longitude 92 degrees 01 minute 49 seconds W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, grayish brown (10YR 5/2) dry; moderate thin platy structure parting to moderate fine granular; friable; few fine roots; few distinct silt coatings on faces of peds; strongly acid; abrupt smooth boundary.

E1—6 to 11 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; weak thin platy structure; friable; few fine roots; common distinct silt coatings on faces of peds; very strongly acid; clear smooth boundary.

E2—11 to 17 inches; brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry; weak thin platy structure; friable; few fine roots; common distinct silt coatings on faces of peds; common fine faint yellowish brown (10YR 5/4) redox concentrations; very strongly acid; clear smooth boundary.

2Bt1—17 to 32 inches; brown (7.5YR 4/4) clay; moderate medium and coarse subangular blocky structure; very firm; few fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine yellowish red (5YR 4/6) redox concentrations; many fine and medium prominent dark grayish brown (2.5Y 4/2) redox depletions; 1 percent pebbles; very strongly acid; gradual smooth boundary.

2Bt2—32 to 38 inches; brown (10YR 4/3) clay; moderate medium and coarse subangular blocky structure; very firm; few fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine prominent dark red (2.5YR 3/6) redox concentrations; common fine and medium distinct dark grayish brown (2.5Y 4/2) redox depletions; 1 percent pebbles; very strongly acid; clear smooth boundary.

2Btg—38 to 52 inches; gray (10YR 5/1) clay loam; moderate medium and coarse subangular blocky structure; very firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium and coarse prominent dark red (10R 3/6) and common fine prominent yellowish brown (10YR 5/6) redox concentrations;

1 percent pebbles; strongly acid; gradual smooth boundary.

2BC—52 to 70 inches; yellowish brown (10YR 5/6) clay loam; moderate medium and coarse subangular blocky structure; firm; common fine prominent strong brown (7.5YR 4/6) redox concentrations; many medium and coarse prominent gray (10YR 5/1) redox depletions; 1 percent pebbles; slightly acid; gradual smooth boundary.

2C—70 to 80 inches; yellowish brown (10YR 5/6) clay loam; massive; firm; common fine distinct strong brown (7.5YR 4/6) redox concentrations; many medium and coarse prominent gray (10YR 5/1) redox depletions; few fine rounded soft masses of lime; 1 percent pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to 75 inches
Depth to carbonates: 42 to 75 inches
Depth to 2Bt horizon: 8 to 17 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—4
Chroma—2
Texture—loam or clay loam

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—loam, silt loam, or clay loam

2Bt horizon:
Hue—5YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—clay

2Btg horizon:
Hue—10YR, 7.5YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 to 6
Texture—clay or clay loam

2BC horizon:
Hue—10YR, 7.5YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 to 6
Texture—clay loam

2C horizon:
Hue—10YR, 7.5YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 to 6
Texture—clay loam

425D—Keswick loam, 9 to 14 percent slopes

Composition

Keswick and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.1 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils
- Weller and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

425D2—Keswick clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Keswick and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.4 inches (moderate)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Lindley and similar soils
- Weller and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

Klum Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Alluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 3 percent

Typical Pedon

Klum fine sandy loam, 0 to 2 percent slopes, rarely flooded, 95 feet west and 103 feet south of the northeast corner of sec. 11, T. 68 N., R. 9 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 42 seconds N. and longitude 91 degrees 51 minutes 10 seconds W.

Ap—0 to 7 inches; dark brown (10YR 3/3) fine sandy loam with few thin strata of brown (10YR 4/3) fine sandy loam; grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately acid; abrupt smooth boundary.

C1—7 to 44 inches; stratified, very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) sandy loam, loamy sand, and loam; massive with horizontal cleavage planes; friable; few fine roots; neutral; clear smooth boundary.

C2—44 to 52 inches; stratified, dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) loamy sand and sandy loam; massive; very friable; neutral; clear smooth boundary.

C3—52 to 80 inches; stratified, dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) sand and loamy sand; common fine distinct grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) redox depletions; single grain; loose; 2 to 5 percent pebbles; neutral.

Range in Characteristics

Thickness of the solum: 6 to 10 inches

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—2 or 3
Texture—fine sandy loam

C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—3 to 5
Chroma—2 to 8
Texture—stratified fine sandy loam, sandy loam, silt loam, loam, or loamy fine sand

208—Klum fine sandy loam, 0 to 2 percent slopes, occasionally flooded

Composition

Klum and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Fine sandy loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 8.3 inches (moderate)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section

3208—Klum fine sandy loam, 0 to 2 percent slopes, rarely flooded

Composition

Klum and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Position on landform: Toeslopes
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Fine sandy loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Sandy alluvium
Flooding frequency: Rare
Depth to the water table: 3 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 8.3 inches (moderate)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section

Kniffin Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 2 to 9 percent

Typical Pedon

Kniffin silt loam, 2 to 5 percent slopes, 2,390 feet south and 1,670 feet west of the northeast corner of sec. 27, T. 68 N., R. 9 W.; USGS Keosauqua, Iowa, Topographic Quadrangle; latitude 40 degrees 39 minutes 40 seconds N. and longitude 91 degrees 52 minutes 44 seconds W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure;

friable; few fine roots; neutral; abrupt smooth boundary.

E—9 to 13 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; common distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Btg1—13 to 18 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; many prominent clay films on faces of peds; few fine distinct yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg2—18 to 23 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—23 to 30 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—30 to 38 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; common distinct clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg5—38 to 52 inches; light olive gray (5Y 6/2) silty clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; common prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg6—52 to 60 inches; light olive gray (5Y 6/2) silty clay loam; weak coarse subangular blocky structure; firm; few fine roots; very few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct clay films on faces of peds; common medium and coarse prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam or silty clay loam

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2
Texture—silt loam or silty clay loam

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2
Texture—silty clay or silty clay loam

531B—Kniffin silt loam, 2 to 5 percent slopes

Composition

Kniffin and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained

Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.9 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

531B2—Kniffin silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

Kniffin and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.1 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

531C2—Kniffin silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Kniffin and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.1 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Rinda and similar soils

• Armstrong and similar soils

Major Uses of the Unit

• Cropland
• Hayland
• Pasture
• Forest land

For general and detailed information concerning these uses, see Part II of this publication:

• “Agronomy” section
• “Forest Land” section

Lawson Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Lawson silt loam, 0 to 2 percent slopes, rarely flooded, 2,530 feet west and 1,240 feet north of the southeast corner of sec. 15, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 41 minutes 09 seconds N. and longitude 91 degrees 45 minutes 55 seconds W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak very fine and fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

A1—8 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine and medium subangular blocky structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

A2—19 to 30 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

A3—30 to 44 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

Bw—44 to 62 inches; very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam with few thin strata of brown (10YR 4/3) silt loam; moderate medium prismatic structure; friable; few fine roots; few distinct very dark grayish brown (10YR 3/2) coatings on faces of peds; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; slightly acid; gradual smooth boundary.

BC—62 to 72 inches; brown (10YR 4/3) silt loam; weak medium prismatic structure; friable; few thin strata of sandy loam; common fine faint dark yellowish brown (10YR 4/4) and few fine distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

C—72 to 80 inches; brown (10YR 4/3) silt loam; massive; few thin strata of sandy loam; common fine faint dark yellowish brown (10YR 4/4) and few fine distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to more than 80 inches
Thickness of the mollic epipedon: 36 to 66 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

Bw horizon:
Hue—10YR
Value—3
Chroma—2 or 3
Texture—silt loam or silty clay loam

BC horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—1 to 3
Texture—silt loam or silty clay loam

C horizon:
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—1 to 3
Texture—silt loam or silty clay loam

3484—Lawson silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Lawson and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.1 inches (high)
Content of organic matter in the surface layer: About 5 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Lindley Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Glacial till
Native vegetation: Forest
Slope range: 9 to 40 percent

Typical Pedon

Lindley loam, 25 to 40 percent slopes, 2,200 feet south and 1,100 feet east of the northwest corner of sec. 33, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 38 minutes 50 seconds N. and longitude 91 degrees 47 minutes 28 seconds W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; few fine roots; moderately acid; clear smooth boundary.

E—4 to 8 inches; yellowish brown (10YR 5/4) loam, very pale brown (10YR 7/3) dry; weak very fine subangular blocky structure parting to weak very fine granular; friable; few fine roots; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; 1 percent pebbles; very strongly acid; clear smooth boundary.

BE—8 to 13 inches; yellowish brown (10YR 5/6) clay loam; weak very fine subangular blocky structure; friable; few fine roots; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; few faint clay films on faces of peds and in pores; 1 percent pebbles; strongly acid; clear smooth boundary.

Bt1—13 to 24 inches; yellowish brown (10YR 5/8) clay loam; moderate very fine and fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 1 percent pebbles; strongly acid; gradual smooth boundary.

Bt2—24 to 40 inches; yellowish brown (10YR 5/8) clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

Bt3—40 to 48 inches; yellowish brown (10YR 5/8) clay loam; weak fine and medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine distinct strong brown (7.5YR 5/8) redox concentrations; few fine distinct grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; clear wavy boundary.

C—48 to 60 inches; strong brown (7.5YR 5/6) clay loam; massive; firm; few fine roots; common medium distinct yellowish brown (10YR 5/4) redox concentrations; common medium and coarse prominent light gray (10YR 6/1) redox depletions; few fine black irregular soft masses of iron-manganese; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 60 inches
Depth to carbonates: 46 to 60 inches
Content of rock fragments: 1 to 3 percent

A or Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Texture—loam

E horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture—loam or silt loam

BE horizon:
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture—clay loam or loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture—clay loam or loam

C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—1 to 6
Texture—loam or clay loam

65D—Lindley loam, 9 to 14 percent slopes

Composition

Lindley and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Keswick and similar soils
- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

65D2—Lindley loam, 9 to 14 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet

Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Keswick and similar soils
- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

65E—Lindley loam, 14 to 18 percent slopes

Composition

Lindley and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

65E2—Lindley loam, 14 to 18 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Inclusions

- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

65F2—Lindley loam, 18 to 25 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 18 to 25 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Keswick and similar soils

Major Uses of the Unit

- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

65G—Lindley loam, 25 to 40 percent slopes

Composition

Lindley and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 25 to 40 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Keswick and similar soils

Major Uses of the Unit

- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

424D2—Lindley-Keswick complex, 9 to 14 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 60 percent
Keswick and similar soils: About 30 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Lindley

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

Keswick

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.4 inches (moderate)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils
- Weller and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

424E2—Lindley-Keswick complex, 14 to 18 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 60 percent
Keswick and similar soils: About 30 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 14 to 18 percent

Component Description

Lindley

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

Keswick

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over a reddish paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.4 inches (moderate)

Content of organic matter in the surface layer: About 1.5 percent (moderately low)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Mt. Sterling Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate in the upper part and slow in the lower part
Landform: Flood plains and alluvial fans
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded, 1,800 feet west and 200 feet north of the southeast corner of sec. 1, T. 67 N., R. 10 W.; USGS Mount Sterling, Iowa, Topographic Quadrangle; latitude 40 degrees 37 minutes 27 seconds N. and longitude 91 degrees 57 minutes 17 seconds W.

Ap—0 to 7 inches; alternating layers of very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) silt loam, grayish brown (10YR 5/2) and light gray (10YR 7/2) dry; weak very fine and fine granular structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine distinct brown (10YR 4/3) redox concentrations; neutral; abrupt smooth boundary.

C—7 to 26 inches; alternating layers of very dark grayish brown (10YR 3/2), dark gray (10YR 4/1), and grayish brown (10YR 5/2) silt loam; massive with horizontal bedding planes; friable; few fine roots; common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; slightly acid; clear smooth boundary.

2Ab1—26 to 32 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; friable; few fine roots; few fine prominent brown (7.5YR 4/4) redox concentrations; few fine faint very dark grayish brown (10YR 3/2) redox depletions; moderately acid; gradual smooth boundary.

2Ab2—32 to 44 inches; black (N 2/0) silty clay, very dark gray (10YR 3/1) dry; weak fine and medium prismatic structure parting to moderate very fine and fine subangular blocky; firm; few fine roots; few fine prominent brown (7.5YR 4/4) redox concentrations; very strongly acid; gradual smooth boundary.

2Ab3—44 to 54 inches; very dark gray (10YR 3/1) and dark gray (10YR 4/1) silty clay loam, dark gray (10YR 4/1) and gray (10YR 5/1) dry; weak medium prismatic structure; firm; few fine roots; few fine prominent strong brown (7.5YR 4/6) redox concentrations; very strongly acid; gradual smooth boundary.

2C—54 to 80 inches; dark gray (10YR 4/1) silty clay loam; massive; firm; few fine roots; common fine prominent brown (7.5YR 4/4) and common fine distinct dark yellowish brown (10YR 4/4) redox concentrations; very strongly acid.

Range in Characteristics

Thickness of the solum: 5 to 10 inches
Depth to the 2Ab horizon: 20 to 36 inches

Ap horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

C horizon:
Hue—10YR
Value—2 to 6
Chroma—1 or 2
Texture—silt loam

2Ab horizon:
Hue—10YR or N
Value—2 to 4
Chroma—0 or 1
Texture—silty clay or silty clay loam

2C horizon:
Hue—10YR
Value—4
Chroma—1 or 2
Texture—silty clay loam

460—Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded

Composition

Mt. Sterling and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.4 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

Mystic Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Stream terraces
Parent material: Reddish paleosol weathered from old valley alluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 9 to 14 percent

Typical Pedon

Mystic clay loam, 9 to 14 percent slopes, moderately eroded, 2,200 feet west and 255 feet north of the center of sec. 12, T. 67 N., R. 10 W.; USGS Mount Sterling, Iowa, Topographic Quadrangle; latitude 40 degrees 36 minutes 58 seconds N. and longitude 91 degrees 57 minutes 57 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay loam, grayish brown (10YR 5/2) dry; common streaks and pockets of brown (10YR 4/3) subsoil material; weak very fine and fine granular structure; friable; few fine roots; moderately acid; abrupt smooth boundary.

BE—7 to 13 inches; brown (7.5YR 4/4) clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) coatings on faces of peds; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Bt1—13 to 20 inches; brown (7.5YR 5/4) and yellowish brown (10YR 5/4) clay loam; weak fine and medium subangular blocky structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings on faces of peds and in pores; few fine prominent red (2.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt2—20 to 26 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings on faces of peds and in pores; few fine prominent red (2.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—26 to 38 inches; brown (10YR 5/3) clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings on faces of peds and in pores; many medium and coarse prominent red (2.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 2 to 5 percent pebbles in the lower part; strongly acid; gradual smooth boundary.

Bt4—38 to 47 inches; red (2.5YR 4/4) clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots; few prominent grayish brown (10YR 5/2) clay films on faces of peds; few fine prominent yellowish brown (10YR 5/6) redox concentrations; common medium prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

BC—47 to 59 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure; friable; common fine prominent red (2.5YR 4/6) redox concentrations; common fine prominent grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) redox depletions; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; strongly acid; gradual smooth boundary.

C—59 to 80 inches; strong brown (7.5YR 5/8) clay loam; massive; friable; common fine and medium prominent grayish brown (10YR 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid;

Range in Characteristics

Thickness of the solum: 48 to 60 inches
Content of rock fragments: 1 to 5 percent

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—clay loam

BE horizon:
Hue—7.5YR or 5YR
Value—4 or 5
Chroma—3 or 4
Texture—clay loam

Bt horizon:
Hue—2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture—clay loam, clay, or silty clay

BC horizon:
Hue—5YR, 7.5YR, or 10YR
Value—3 to 5
Chroma—2 to 8
Texture—clay loam or silty clay loam

C horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 to 6
Chroma—2 to 8
Texture—loam or clay loam

592D2—Mystic clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Mystic and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Reddish paleosol weathered from old valley alluvium
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Nodaway Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Flood plains and upland drainageways
Parent material: Silty alluvium

Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 3 percent

Typical Pedon

Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded, 180 feet east and 50 feet south of the northwest corner of sec. 9, T. 70 N., R. 9 W.; USGS Fairfield South, Iowa, Topographic Quadrangle; latitude 40 degrees 53 minutes 09 seconds N. and longitude 91 degrees 54 minutes 11 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; horizontal cleavage planes; neutral; gradual smooth boundary.
C1—7 to 42 inches; stratified very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), dark grayish brown (10YR 4/2), and grayish brown (10YR 5/2) silt loam; massive with common horizontal cleavage planes; friable; few fine roots; few distinct silt coatings on faces of peds; neutral; gradual smooth boundary.
C2—42 to 60 inches; stratified very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam; massive with common horizontal cleavage planes; friable; few fine roots; few thin strata of faint dark grayish brown (10YR 4/2) loam; moderately acid.

Range in Characteristics

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam

C horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture—stratified silt loam or silty clay loam

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

Composition

Nodaway and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Klum and similar soils
- Mt. Sterling and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

315—Nodaway-Klum-Perks complex, 0 to 3 percent slopes, occasionally flooded

Composition

Nodaway and similar soils: About 40 percent
Klum and similar soils: About 30 percent
Perks and similar soils: About 20 percent
Inclusions: About 10 percent

Setting

Landform: Flood plains
Slope range: 0 to 3 percent

Component Description

Nodaway

Texture of the surface layer: Silt loam

Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2.0 percent (moderate)

Klum

Texture of the surface layer: Fine sandy loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 8.3 inches (moderate)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

Perks

Texture of the surface layer: Loamy sand
Depth to bedrock: More than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy alluvium
Flooding frequency: Occasional
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 2.3 inches (very low)
Content of organic matter in the surface layer: About 1.25 percent (moderately low)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Mt. Sterling and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

729—Nodaway-Coppock complex, 0 to 2 percent slopes, occasionally flooded

Composition

Nodaway and similar soils: About 65 percent
Coppock and similar soils: About 35 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Nodaway

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Coppock

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

730B—Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes

Composition

Nodaway and similar soils: About 40 percent
Coppock and similar soils: About 30 percent
Cantril and similar soils: About 20 percent
Inclusions: About 10 percent

Setting

Landform: Upland drainageways
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 2 to 5 percent

Component Description

Nodaway

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding: None
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Coppock

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

Cantril

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loamy alluvium
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.6 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

1715—Nodaway-Vesser-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded

Composition

Nodaway and similar soils: About 45 percent
Vesser and similar soils: About 30 percent
Mt. Sterling and similar soils: About 20 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Nodaway

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Vesser

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Mt. Sterling

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.4 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Forest Land” section

3220—Nodaway silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Nodaway and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

3315—Nodaway-Klum-Perks complex, 0 to 3 percent slopes, rarely flooded

Composition

Nodaway and similar soils: About 45 percent
Klum and similar soils: About 30 percent
Perks and similar soils: About 20 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 3 percent

Component Description

Nodaway

Texture of the surface layer: Silt loam
Depth to bedrock: More than 80 inches

Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 3 to 5 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Klum

Texture of the surface layer: Fine sandy loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Flooding frequency: Rare
Depth to the water table: 3 to 6 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 8.3 inches (moderate)
Content of organic matter in the surface layer: About 2 percent (moderate)

Perks

Texture of the surface layer: Loamy sand
Depth to bedrock: More than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy alluvium
Flooding frequency: Rare
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 2.3 inches (very low)
Content of organic matter in the surface layer: About 1 percent (moderately low)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Nordness Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess over residuum derived from limestone bedrock
Native vegetation: Forest
Slope range: 25 to 40 percent

Typical Pedon

Nordness silt loam, in an area of Nordness-Bentonsport complex, 25 to 40 percent slopes, 2,020 feet north and 1,000 feet west of the southeast corner of sec. 9, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 08 seconds N. and longitude 91 degrees 46 minutes 47 seconds W.

A—0 to 2 inches; dark brown (10YR 3/3) silt loam, yellowish brown (10YR 5/4) dry; weak very fine and fine granular structure; friable; common fine and medium roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.
BE—2 to 5 inches; brown (10YR 4/3) silt loam; weak thin platy structure parting to weak very fine subangular blocky; friable; common fine and medium roots; very few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.
2Bt—5 to 11 inches; brown (7.5YR 5/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common fine and medium roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; 1 percent pebbles; 5 percent cobbles; slightly acid; abrupt wavy boundary.
2C—11 to 14 inches; brown (7.5YR 5/4) very channery silty clay loam; channers of rock 2 to 6 inches in diameter and 1 to 3 inches thick; fine textured material makes up about 40 percent by volume; slabs interrupted by vertical weathering joints containing reddish calcareous silty clay loam; strongly effervescent; slightly alkaline.
2R—14 inches; hard, fractured limestone bedrock.

Range in Characteristics

Thickness of the solum: 8 to 20 inches
Depth to bedrock: 8 to 20 inches
Content of rock fragments: 1 to 10 percent

A horizon:
Hue—10YR

Value—3 or 4
Chroma—1 to 3
Texture—silt loam

BE horizon:
Hue—10YR
Value—4
Chroma—3 or 4
Texture—silt loam, silty clay loam, loam, or clay loam

2Bt horizon:
Hue—7.5YR or 5YR
Value—3 to 5
Chroma—2 to 6
Texture—silt loam, silty clay loam, loam, or clay loam

2C horizon:
Hue—7.5YR or 5YR
Value—3 to 5
Chroma—2 to 6
Texture—very channery silt loam, very channery silty clay loam, very channery loam, or very channery clay loam
Content of rock fragments—35 to 60 percent

2R layer:
Type of bedrock—hard, fractured limestone

599G—Nordness-Gosport complex, 25 to 40 percent slopes

Composition

Nordness and similar soils: About 50 percent
Gosport and similar soils: About 45 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Nose slopes and side slopes
Hillslope position: Backslopes
Slope range: 25 to 40 percent

Component Description

Nordness

Texture of the surface layer: Silt loam
Depth to bedrock: 8 to 20 inches
Drainage class: Well drained
Dominant parent material: Loess over residuum
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 1.9 inches (very low)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Gosport

Texture of the surface layer: Silt loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over weathered shale
Flooding: None
Depth to the water table: 1.5 to 3.0 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 3.3 inches (low)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils

Major Uses of the Unit

- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

699G—Nordness-Bentonsport complex, 25 to 40 percent slopes

Composition

Nordness and similar soils: About 70 percent
Bentonsport and similar soils: About 25 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Nose slopes and side slopes
Hillslope position: Backslopes
Slope range: 25 to 40 percent

Component Description

Nordness

Texture of the surface layer: Silt loam

Depth to bedrock: 8 to 20 inches
Drainage class: Well drained
Dominant parent material: Loess over residuum
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 1.9 inches (very low)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Bentonsport

Texture of the surface layer: Extremely gravelly loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Colluvium over residuum
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 7.0 inches (moderate)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Lindley and similar soils

Major Uses of the Unit

- Pasture
- Forest land (fig. 10)

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Okaw Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Alluvium
Native vegetation: Forest
Slope range: 0 to 2 percent

Typical Pedon

Okaw silt loam, 0 to 2 percent slopes, rarely flooded, 1,210 feet north and 80 feet west of the southeast corner of sec. 22, T. 70 N., R. 10 W.; USGS Mount Zion, Iowa, Topographic Quadrangle; latitude 40 degrees 50 minutes 43 seconds N. and longitude 91 degrees 59 minutes 13 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak very fine and fine granular structure; friable; few fine roots; many distinct dark grayish brown (10YR 4/2) coatings on faces of peds; very strongly acid; abrupt smooth boundary.

E—7 to 14 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; weak thin platy structure; friable; few fine roots; common distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine distinct yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

BEg—14 to 16 inches; light brownish gray (10YR 6/2) silty clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; common distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

2Btg1—16 to 31 inches; grayish brown (10YR 5/2) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

2Btg2—31 to 46 inches; grayish brown (10YR 5/2) silty clay; weak fine prismatic structure parting to moderate fine subangular blocky; firm; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds and in pores; common medium and coarse prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

2Btg3—46 to 58 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; few prominent dark gray (5Y 4/1) clay films on faces of peds and in pores; common medium and coarse prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Figure 10.—Rock outcrop in a wooded area of Nordness-Bentonsport complex, 25 to 40 percent slopes.

2Cg—58 to 80 inches; light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2) silty clay loam; massive; firm; common medium and coarse prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam

E horizon:
Hue—10YR
Value—4 to 7
Chroma—1 or 2
Texture—silt loam

BEg horizon (if it occurs):
Hue—10YR or 2.5Y
Value—3 to 6
Chroma—1 or 2
Texture—silty clay loam

2Btg horizon:
Hue—10YR, 2.5Y, or N
Value—3 to 6
Chroma—0 to 2
Texture—silty clay, clay, or silty clay loam

2Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—2 or 3
Texture—silty clay, clay, or silty clay loam

263—Okaw silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Okaw and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Alluvium
Flooding frequency: Rare
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.4 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Olmitz Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landform: Alluvial fans and upland drainageways
Parent material: Loamy alluvium
Native vegetation: Prairie
Slope range: 2 to 9 percent

Typical Pedon

Olmitz loam, in an area of Olmitz-Vesser-Zook complex, 0 to 5 percent slopes, 900 feet east and 155 feet south of the northwest corner of sec. 1, T. 67 N., R. 11 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 38 minutes 16 seconds N. and longitude 92 degrees 4 minutes 45 seconds W.

Ap—0 to 9 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; common very fine and fine roots; neutral; abrupt smooth boundary.

A1—9 to 17 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; common very fine and fine roots; neutral; gradual smooth boundary.

A2—17 to 25 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common very fine and fine roots; slightly acid; gradual smooth boundary.

A3—25 to 32 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common very fine and fine roots; neutral; gradual smooth boundary.

Bw1—32 to 46 inches; dark brown (10YR 3/3) clay loam, brown (10YR 4/3) kneaded; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; common very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Bw2—46 to 54 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few coarse prominent very dark gray (10YR 3/1) krotovinas in the upper part; few fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Bw3—54 to 73 inches; brown (10YR 5/3) clay loam; moderate medium and coarse subangular blocky structure; friable; common very fine and fine roots; few distinct grayish brown (10YR 5/2) clay films on faces of peds and in pores; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

C—73 to 80 inches; pale brown (10YR 6/3) clay loam; massive; friable; common fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 36 to 74 inches
Thickness of the mollic epipedon: 24 to 32 inches

Ap horizon:
Hue—10YR
Value—2
Chroma—1 or 2
Texture—loam

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—loam or clay loam

Bw horizon:
Hue—10YR
Value—3 to 5
Chroma—3 or 4
Texture—clay loam

2C horizon:
Hue—10YR
Value—4 to 6
Chroma—3 to 6
Texture—clay loam

13B—Olmitz-Vesser-Zook complex, 0 to 5 percent slopes

Composition

Olmitz and similar soils: About 35 percent
Vesser and similar soils: About 33 percent
Zook and similar soils: About 32 percent

Setting

Landform: Upland drainageways
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: Olmitz—2 to 5 percent; Vesser—2 to 5 percent; Zook—0 to 2 percent

Component Description

Olmitz

Texture of the surface layer: Loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Loamy alluvium
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

Vesser

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Zook

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Alluvium
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.1 inches (high)
Content of organic matter in the surface layer: About 6 percent (high)

Typical soil series descriptions with range in characteristics are included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

273B—Olmitz loam, 2 to 5 percent slopes

Composition

Olmitz and similar soils: 100 percent

Setting

Landform: Alluvial fans and upland drainageways
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Loamy alluvium
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

273C—Olmitz loam, 5 to 9 percent slopes

Composition

Olmitz and similar soils: 100 percent

Setting

Landform: Alluvial fans
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 80 inches
Drainage class: Moderately well drained
Dominant parent material: Loamy alluvium
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 10.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

5040—Orthents, loamy

Composition

Orthents: Variable

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Flooding: None
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 6.6 inches (moderate)

Additional information specific to this map unit is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- These soils are too variable to be rated for specific uses.

Perks Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid

Landform: Flood plains
Parent material: Sandy alluvium
Native vegetation: Forest
Slope range: 0 to 5 percent

Typical Pedon

Perks loamy sand, 2 to 5 percent slopes, rarely flooded, 370 feet north and 200 feet west of the southeast corner of sec. 34, T. 69 N., R. 10 W.; USGS Keosauqua, Iowa, Topographic Quadrangle; latitude 40 degrees 43 minutes 37 seconds N. and longitude 91 degrees 59 minutes 14 seconds W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy sand, brown (10YR 5/3) dry; weak very fine and fine subangular blocky structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.
C1—9 to 20 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; few fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; moderately acid; gradual smooth boundary.
C2—20 to 44 inches; yellowish brown (10YR 5/4) sand; single grain; loose; few fine roots; slightly acid; clear smooth boundary.
C3—44 to 55 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few fine roots; common distinct dark yellowish brown (10YR 4/4) organic coatings on faces of peds; slightly acid; clear smooth boundary.
C4—55 to 73 inches; yellowish brown (10YR 5/6) loamy sand; massive; friable; few fine roots; few distinct dark yellowish brown (10YR 4/4) organic coatings on faces of peds; moderately acid; clear smooth boundary.
C5—73 to 80 inches; dark yellowish brown (10YR 4/6) sand; single grain; loose; moderately acid.

Range in Characteristics

Thickness of the solum: 5 to 9 inches

Ap or A horizon:
Hue—10YR
Value—2 to 4
Chroma—1 to 3
Texture—loamy sand

C horizon:
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture—sand or loamy sand

139—Perks loamy sand, 0 to 2 percent slopes, occasionally flooded

Composition

Perks and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Loamy sand
Depth to bedrock: More than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy alluvium
Flooding frequency: Occasional
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 2.3 inches (very low)
Content of organic matter in the surface layer: About 1.25 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

139B—Perks loamy sand, 2 to 5 percent slopes, rarely flooded

Composition

Perks and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Loamy sand
Depth to bedrock: More than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy alluvium
Flooding frequency: Rare
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 2.3 inches (very low)
Content of organic matter in the surface layer: About 1.25 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

3139—Perks loamy sand, 0 to 2 percent slopes, rarely flooded

Composition

Perks and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Loamy sand
Depth to bedrock: More than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy alluvium
Flooding frequency: Rare
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 2.3 inches (very low)
Content of organic matter in the surface layer: About 1 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Colo and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Pershing Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands and stream terraces
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 2 to 9 percent

Typical Pedon

Pershing silt loam, 2 to 5 percent slopes, 1,280 feet south and 100 feet east of the northwest corner of sec. 20, T. 70 N., R. 9 W.; USGS Mount Zion, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 12 seconds N. and longitude 91 degrees 55 minutes 46 seconds W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak very fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

E—9 to 15 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; weak thin platy structure parting to weak very fine and fine subangular blocky; friable; few fine roots; many prominent light gray (10YR 7/1) silt coatings on faces of peds; moderately acid; clear smooth boundary.

BE—15 to 17 inches; grayish brown (10YR 5/2) silty clay loam; weak thin platy structure parting to weak fine subangular blocky; friable; few fine roots; common prominent light gray (10YR 7/1) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Btg1—17 to 23 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg2—23 to 34 inches; grayish brown (2.5Y 5/2) silty clay; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many prominent clay films on faces of peds; many fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg3—34 to 49 inches; light gray (10YR 6/1) silty clay; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct clay films on faces of peds; few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; many fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

BCg—49 to 60 inches; light gray (10YR 6/1) silty clay loam; weak medium prismatic structure; firm; few fine roots; many fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid.

Range in Characteristics

Thickness of the solum: 48 to more than 60 inches

Ap or A horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam or silty clay loam

E horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silt loam

BE horizon (if it occurs):
Hue—2.5Y or 10YR
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 8
Texture—silty clay or silty clay loam

BCg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay loam

131B—Pershing silt loam, 2 to 5 percent slopes

Composition

Pershing and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 12.0 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Rinda and similar soils
- Belinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

131B2—Pershing silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

Pershing and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 11.8 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Armstrong and similar soils
- Belinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

131C—Pershing silt loam, 5 to 9 percent slopes

Composition

Pershing and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 12.0 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Armstrong and similar soils
- Rinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

- “Forest Land” section

131C2—Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Pershing and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 11.7 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Armstrong and similar soils
- Rinda and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

831B—Pershing silt loam, bench, 2 to 5 percent slopes

Composition

Pershing and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 12.0 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

831C2—Pershing silty clay loam, bench, 5 to 9 percent slopes, moderately eroded

Composition

Pershing and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 11.7 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section
- "Forest Land" section

5010—Pits, sand and gravel

Composition

Pits, sand and gravel: Variable

Component Description

Texture of the surface layer: Gravelly sand
Depth to bedrock: More than 60 inches
Flooding: None
Depth to the water table: More than 6 feet

5020—Pits and Dumps

Composition

Pits and Dumps: Variable

Component Description

Type of material: Unweathered bedrock
Flooding: None
Depth to the water table: More than 6 feet

5030—Pits, limestone quarries

Composition

Pits, limestone quarries: Variable

Component Description

Type of material: Unweathered bedrock (fig. 11)
Flooding: None
Depth to the water table: More than 6 feet

Racoon Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Silty alluvium
Native vegetation: Forest
Slope range: 0 to 2 percent

Typical Pedon

Racoon silt loam, 0 to 2 percent slopes, occasionally flooded, 500 feet north and 1,360 feet west of the southeast corner of sec. 16, T. 70 N., R. 10 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 51 minutes 28 seconds N. and longitude 92 degrees 00 minutes 39 seconds W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine and fine granular structure; friable; few fine roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; strongly acid; abrupt smooth boundary.

E1—9 to 19 inches; light brownish gray (10YR 6/2) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure; friable; few fine roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; few fine prominent dark yellowish brown

Figure 11.—An area of Pits, limestone quarries.

(10YR 4/6) and brown (7.5YR 4/4) redox concentrations; common fine faint light gray (10YR 7/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

E2—19 to 30 inches; light brownish gray (10YR 6/2) silt loam, pale brown (10YR 6/3) dry; weak very thick platy structure parting to weak very fine and fine subangular blocky; friable; few fine roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; few fine prominent dark yellowish brown (10YR 4/6) and brown (7.5YR 4/4) redox concentrations; few fine faint light gray (10YR 7/2) redox depletions; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

BE—30 to 38 inches; olive gray (5Y 5/2) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; very few distinct white (10YR 8/1 dry) silt coatings on faces of peds; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine prominent dark gray (10YR 4/1) and light gray (10YR 7/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg1—38 to 49 inches; olive gray (5Y 5/2) silty clay loam; weak medium angular blocky structure; firm; few fine roots; common faint clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; few fine distinct dark gray (5Y 4/1) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg2—49 to 63 inches; olive gray (5Y 5/2) silty clay loam; weak medium prismatic structure parting to moderate medium angular blocky; firm; many distinct clay films on faces of peds; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; few fine distinct dark gray (5Y 4/1) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Cg—63 to 80 inches; light olive gray (5Y 6/2) silty clay loam; massive; friable; common fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent dark yellowish brown (10YR 4/4) redox concentrations; few fine distinct dark gray (5Y 4/1) redox depletions; few fine black irregular soft masses of iron-manganese; very slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 36 to 65 inches

Ap or A horizon:
Hue—10YR
Value—4 or 5
Chroma—2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 to 7
Chroma—1 or 2
Texture—silt loam

BE horizon (if it occurs):
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1
Texture—silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2
Texture—silty clay loam

720—Racoon silt loam, 0 to 2 percent slopes, occasionally flooded

Composition

Racoon and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.2 inches (high)
Content of organic matter in the surface layer: About 1.5 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Forest land
- Cropland

For general and detailed information concerning these uses, see Part II of this publication:

- "Forest Land" section
- "Agronomy" section

3720—Racoon silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Racoon and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam

Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.2 inches (high)
Content of organic matter in the surface layer: About 3 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Forest Land” section

Rathbun Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess
Native vegetation: Forest
Slope range: 2 to 9 percent

Typical Pedon

Rathbun silt loam, 2 to 5 percent slopes, 760 feet west and 1,500 feet south of the northeast corner of sec. 32, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 38 minutes 57 seconds N. and longitude 91 degrees 47 minutes 53 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak very fine and fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

E—5 to 12 inches; grayish brown (10YR 5/2) silt loam, white (10YR 8/1) dry; moderate thin platy structure; friable; few fine roots; few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; very strongly acid; abrupt smooth boundary.

Btg—12 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; few distinct grayish brown (10YR 5/2) silt coatings on faces of peds; common distinct clay films on faces of peds and in pores; common fine faint yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Bt1—16 to 24 inches; brown (10YR 4/3) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine distinct dark yellowish brown (10YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt2—24 to 32 inches; brown (10YR 5/3) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine prominent strong brown (7.5YR 5/6) and common distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

B´tg1—32 to 46 inches; grayish brown (2.5Y 5/2) and brown (10YR 5/3) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) and few fine prominent reddish brown (5YR 4/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

B´tg2—46 to 63 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; few fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Cg—63 to 80 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silty clay loam; massive; firm; few fine prominent strong brown (7.5YR 4/6) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 62 to 70 inches

Ap or A horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam or silty clay loam

E horizon (if it occurs):
Hue—10YR
Value—5
Chroma—2 to 4
Texture—silt loam

Bt horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture—silty clay

Btg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2 or 3
Texture—silty clay loam

Cg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2
Texture—silty clay loam

532B—Rathbun silt loam, 2 to 5 percent slopes

Composition

Rathbun and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.7 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Poorly drained soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

532C—Rathbun silt loam, 5 to 9 percent slopes

Composition

Rathbun and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.8 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils
- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

532C2—Rathbun silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Rathbun and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.3 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Ashgrove and similar soils
- Keswick and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Reedscreek Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Alluvium over limestone bedrock
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 3 percent

Typical Pedon

Reedscreek loam, 0 to 3 percent slopes, occasionally flooded, 2,370 feet west and 1,640 feet south of the northeast corner of sec. 15, T. 68 N., R. 8 W.; USGS Bonaparte, Iowa, Topographic Quadrangle; latitude 40 degrees 41 minutes 32 seconds N. and longitude 91 degrees 45 minutes 59 seconds W.

A—0 to 6 inches; alternating layers of very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and brown (10YR 4/3) loam, grayish brown (10YR 5/2), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) dry, very dark grayish brown (10YR 3/2) kneaded; weak very fine and fine granular structure; friable; few fine roots; 2 percent pebbles; 2 percent cobbles; 1 percent stones; slightly alkaline; clear smooth boundary.

C1—6 to 12 inches; dark grayish brown (10YR 4/2) loam; massive; friable; few fine and medium roots; common fine prominent brown (7.5YR 4/4) redox concretions; 2 percent pebbles; 4 percent cobbles; 1 percent stones; very slightly effervescent; slightly alkaline; clear wavy boundary.

C2—12 to 15 inches; alternating layers of dark grayish brown (10YR 4/2) and brown (10YR 4/3) very cobbly sandy loam; massive; friable; few fine and medium roots; 4 percent pebbles; 20 percent cobbles; 15 percent stones; slightly effervescent; moderately alkaline; clear wavy boundary.

C3—15 to 24 inches; stratified, dark grayish brown (10YR 4/2) and brown (10YR 4/3) cobbly sandy loam and cobbly loam; massive; friable; few fine and medium roots; 1 percent pebbles; 15 percent cobbles; 5 percent stones; very slightly effervescent; slightly alkaline; clear wavy boundary.

C4—24 to 32 inches; stratified, brown (10YR 4/3) very cobbly sandy loam and very cobbly loamy sand; massive; friable; few fine and medium roots; 1 percent pebbles; 30 percent cobbles; 5 percent stones; very slightly effervescent; slightly alkaline; clear wavy boundary.

C5—32 to 39 inches; stratified, brown (10YR 4/3) very cobbly sandy loam and very cobbly loamy sand; massive; very friable; 1 percent pebbles; 40 percent cobbles; 1 percent stones; strongly effervescent; moderately alkaline; clear wavy boundary.

C6—39 to 47 inches; stratified, dark grayish brown (10YR 4/2) and brown (10YR 4/3) very cobbly sandy loam and very cobbly loamy sand; massive; very friable; 1 percent pebbles; 40 percent cobbles; 10 percent stones; strongly effervescent; moderately alkaline; clear wavy boundary.

C7—47 to 66 inches; stratified, dark grayish brown (10YR 4/2) and brown (10YR 4/3) very stony sandy loam and very stony loamy sand; massive; very friable; 5 percent pebbles; 20 percent cobbles; 40 percent stones; strongly effervescent; moderately alkaline; abrupt wavy boundary.

2R—66 inches; hard, fractured limestone bedrock.

Range in Characteristics

Thickness of the solum: 6 to 10 inches
Depth to bedrock: More than 60 inches
Content of rock fragments: More than 35 percent

A horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—loam
Content of rock fragments—0 to 10 percent

C horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—cobbly, very cobbly, or very stony loam, sandy loam, or loamy sand
Content of rock fragments—35 to 60 percent

2R layer:
Type of bedrock—hard, fractured limestone

197—Reedscreek loam, 0 to 3 percent slopes, occasionally flooded

Composition

Reedscreek and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 3 percent

Component Description

Texture of the surface layer: Loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Alluvium over limestone bedrock
Flooding frequency: Occasional
Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 7.5 inches (moderate)
Content of organic matter in the surface layer: About 1.25 percent (moderately low)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Richwood Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Stream terraces
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Richwood silt loam, 0 to 2 percent slopes, 860 feet east and 560 feet south of the northwest corner of sec. 17, T. 70 N., R. 11 W.; USGS Selma, Iowa, Topographic Quadrangle; latitude 40 degrees 52 minutes 11 seconds N. and longitude 92 degrees 09 minutes 19 seconds W.

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately acid; abrupt smooth boundary.

A—7 to 16 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

BA—16 to 21 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 3/3) organic coatings on faces of peds; moderately acid; clear smooth boundary.

Bt1—21 to 35 inches; brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2—35 to 54 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 3/3) clay films on faces of peds; few fine black irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

2BC—54 to 60 inches; dark yellowish brown (10YR 4/4) loam; weak medium prismatic structure; friable; few fine black irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

2C1—60 to 69 inches; alternating layers of dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) sandy loam; massive; friable; few fine black irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

2C2—69 to 78 inches; alternating layers of dark yellowish brown (10YR 4/4 and 4/6) sandy loam; massive; very friable; few fine black irregular soft masses of iron-manganese; neutral; clear smooth boundary.

2C3—78 to 88 inches; alternating layers of yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/6) loamy sand; single grain; loose; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 10 to 17 inches
Depth to stratified sediments: 60 to 72 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silt loam

BA horizon:
Hue—10YR
Value—3 to 5
Chroma—3 to 5
Texture—silt loam

Bt horizon:
Hue—10YR or 7.5YR
Value—3 to 5
Chroma—3 to 5
Texture—silt loam or silty clay loam

2BC horizon:
Hue—10YR or 7.5YR
Value—3 to 5
Chroma—3 or 4
Texture—loam or sandy loam

2C horizon:
Hue—10YR or 7.5YR
Value—4 to 8
Chroma—2 to 6
Texture—sandy loam, loamy sand, or sand

977—Richwood silt loam, 0 to 2 percent slopes

Composition

Richwood and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Well drained
Dominant parent material: Silty alluvium
Flooding: None

Depth to the water table: More than 6 feet
Available water capacity to 60 inches or root-limiting layer: About 12.2 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the "Soil Properties" section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- "Agronomy" section

Rinda Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess over a gray paleosol weathered from glacial till
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 5 to 9 percent

Typical Pedon

Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded, 770 feet south and 1,470 feet west of the northeast corner of sec. 10, T. 68 N., R. 11 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 32 seconds N. and longitude 92 degrees 06 minutes 25 seconds W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; common streaks and pockets of dark grayish brown (10YR 4/2) subsoil material; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

BE—6 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak very fine subangular blocky structure; firm; few fine roots; few prominent white (10YR 8/1 dry) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

2Btg1—10 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and yellowish red (5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2Btg2—18 to 26 inches; grayish brown (2.5Y 5/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and yellowish red (5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2Btg3—26 to 34 inches; grayish brown (2.5Y 5/2) silty clay; weak fine and medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

2Btg4—34 to 42 inches; gray (5Y 5/1) silty clay; weak fine and medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly acid; gradual smooth boundary.

2Btg5—42 to 60 inches; light gray (5Y 6/1) silty clay; weak fine and medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; common medium and coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; 1 percent pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to more than 60 inches
Content of rock fragments: 1 to 3 percent

Ap horizon:
Hue—10YR
Value—3

Chroma—1 or 2
Texture—silty clay loam

BE horizon (if it occurs):
Hue—10YR or 2.5YR
Value—4 or 5
Chroma—2
Texture—silty clay loam or silty clay

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay

223C2—Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Rinda and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over a gray paleosol weathered from glacial till
Flooding: None
Depth to the water table: 1 to 3 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

SL—Sewage lagoon

Component Description

• This map unit consists of shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid waste.

Seymour Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess
Native vegetation: Prairie
Slope range: 2 to 5 percent

Typical Pedon

Seymour silt loam, 2 to 5 percent slopes, 2,000 feet west and 90 feet north of the southeast corner of sec. 2, T. 68 N., R. 11 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 42 minutes 41 seconds N. and longitude 92 degrees 05 minutes 23 seconds W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; few fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg1—13 to 19 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; many very dark gray (10YR 3/1) organic coatings on faces of peds; common fine distinct yellowish brown (10YR 5/4) and common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg2—19 to 26 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common very dark gray (10YR 3/1) organic coatings on faces of peds; many fine prominent yellowish red (5YR 5/8) and common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—26 to 35 inches; dark grayish brown (2.5Y 4/2) silty clay; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common medium and coarse prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—35 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common medium and coarse prominent dark reddish brown (5YR 3/4), yellowish red (5YR 4/6), and strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

BCg—50 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; few medium prominent dark reddish brown (5YR 3/4), common medium prominent yellowish red (5YR 4/6), and common medium and coarse prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 60 to 76 inches
Thickness of the mollic epipedon: 10 to 15 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay

Btg horizon (lower part):
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay or silty clay loam

BCg horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2
Texture—silty clay loam

312B—Seymour silt loam, 2 to 5 percent slopes

Composition

Seymour and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

312B2—Seymour silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

Seymour and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Tuskeego Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Stream terraces
Parent material: Silty alluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 2 percent

Typical Pedon

Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded, 225 feet west and 2,388 feet south of the northeast corner of sec. 4, T. 69 N., R. 8 W.; USGS Stockport, Iowa, Topographic Quadrangle; latitude 40 degrees 48 minutes 24 seconds N. and longitude 91 degrees 46 minutes 36 seconds W.

A—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; few fine roots; moderately acid; clear smooth boundary.

E1—9 to 15 inches; dark gray (10YR 4/1) silt loam, gray (10YR 6/1) dry; weak thin platy structure parting to weak fine subangular blocky; friable; few fine roots; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

E2—15 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak thin platy structure parting to weak fine subangular blocky; friable; few fine roots; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Btg1—20 to 24 inches; dark gray (10YR 4/1) silty clay loam; weak fine and medium subangular blocky structure; firm; few fine roots; very few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; common prominent clay films on faces of peds; few fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Btg2—24 to 28 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few prominent black (10YR 2/1) organic coatings in root channels and pores; many prominent clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg3—28 to 36 inches; grayish brown (2.5Y 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; few prominent black (10YR 2/1) organic coatings in root channels and pores; many prominent clay films on faces of peds; many fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Btg4—36 to 45 inches; grayish brown (2.5Y 5/2) silty clay; weak medium and coarse subangular blocky structure; firm; few fine roots; few prominent black (10YR 2/1) organic coatings in root channels and pores; common distinct clay films on faces of peds; few fine prominent strong brown (7.5YR 5/6) and common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

BCg—45 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; weak medium and coarse subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; many fine and medium prominent strong brown (7.5YR 5/6) and common fine and medium yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 48 to more than 60 inches

Ap horizon:
Hue—10YR
Value—3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Texture—silt loam or silty clay loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or silty clay loam

BCg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silty clay loam

453—Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Tuskeego and similar soils: 100 percent

Setting

Landform: Stream terraces
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.5 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Vesser Series

Depth class: Very deep
Drainage class: Somewhat poorly drained and poorly drained
Permeability: Moderate
Landform: Flood plains, upland drainageways, and alluvial fans
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 5 percent

Typical Pedon

Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, 1,395 feet west and 295 feet south of the northeast corner of sec. 17, T. 68 N., R. 11 W.; USGS Milton, Iowa, Topographic Quadrangle; latitude 40 degrees 41 minutes 47 seconds N. and longitude 92 degrees 08 minutes 42 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; neutral; abrupt smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; few fine roots; some mixing of grayish brown (10YR 5/2) material from deep cultivations; neutral; clear smooth boundary.

E1—12 to 19 inches; dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) silt loam, light gray (10YR 6/1) and light brownish gray (10YR 6/2) dry; weak medium platy structure parting to weak fine subangular blocky; friable; few fine roots; common streaks of grayish brown (10YR 5/2) silt loam material in root channels and worm channels; common distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

E2—19 to 25 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium platy structure parting to weak fine subangular blocky; friable; few fine roots; many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few fine distinct yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg1—25 to 38 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; few distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; very few distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—38 to 49 inches; dark grayish brown (10YR 4/2) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; common distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—49 to 61 inches; grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure; firm; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; common distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—61 to 71 inches; grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure; firm; common distinct very dark gray (10YR 3/1) clay films on faces of peds; common fine prominent strong brown (7.5YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

BCg—71 to 80 inches; grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) silty clay loam; weak medium prismatic structure; firm; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many medium and coarse prominent strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 60 to more than 80 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—3 to 5
Chroma—2
Texture—silt loam

Btg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay loam

BCg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay loam

51—Vesser silt loam, 0 to 2 percent slopes, occasionally flooded

Composition

Vesser and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

51+—Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, overwash

Composition

Vesser and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 12.2 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

51B—Vesser silt loam, 2 to 5 percent slopes, rarely flooded

Composition

Vesser and similar soils: 100 percent

Setting

Landform: Alluvial fans
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

3051—Vesser silt loam, 0 to 2 percent slopes, rarely flooded

Composition

Vesser and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 11.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

Wabash Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Flood plains
Parent material: Clayey alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Wabash silty clay, 0 to 2 percent slopes, occasionally flooded, 1,800 feet north and 2,240 feet west of the southeast corner of sec. 23, T. 68 N., R. 11 W.; USGS Cantril, Iowa, Topographic Quadrangle; latitude 40 degrees 40 minutes 20 seconds N. and longitude 92 degrees 05 minutes 27 seconds W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; firm; few fine roots; neutral; abrupt smooth boundary.

A1—9 to 17 inches; black (N 2/0) silty clay, dark gray (N 4/0) dry; moderate fine and medium subangular blocky structure; very firm; few fine roots; slightly acid; gradual smooth boundary.

A2—17 to 31 inches; black (N 2/0) silty clay, dark gray (N 4/0) dry; moderate coarse subangular blocky structure; very firm; few fine roots; common distinct pressure faces; moderately acid; gradual smooth boundary.

Bg1—31 to 48 inches; very dark gray (5Y 3/1) silty clay, gray (N 5/0) dry; moderate coarse subangular blocky structure; very firm; few fine roots; common distinct pressure faces; few fine prominent yellowish brown (10YR 5/4) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bg2—48 to 60 inches; dark gray (5Y 4/1) silty clay; moderate coarse subangular blocky structure; very firm; few fine roots; common distinct pressure faces; many very dark gray (5Y 3/1) krotovinas; common fine prominent yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 50 to more than 60 inches
Thickness of the mollic epipedon: More than 36 inches

Ap and A horizons:
Hue—10YR, 2.5Y, 5Y, or N

Value—2 or 3
Chroma—0 to 2
Texture—silty clay

Bg horizon:
Hue—10YR, 2.5Y, 5Y, or N
Value—2 to 5
Chroma—0 to 2
Texture—silty clay

172—Wabash silty clay, 0 to 2 percent slopes, occasionally flooded

Composition

Wabash and similar soils: About 95 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Clayey alluvium
Flooding frequency: Occasional
Water table depth: At the surface to 1 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 6.9 inches (moderate)
Content of organic matter in the surface layer: About 5 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Zook and similar soils

Major Uses of the Unit

- Cropland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

W—Water

Component Description

- This map unit consists of natural bodies of water.

Weller Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands and stream terraces
Parent material: Loess
Native vegetation: Forest
Slope range: 2 to 14 percent

Typical Pedon

Weller silt loam, 2 to 5 percent slopes, 2,320 feet west and 160 feet north of the southeast corner of sec. 27, T. 70 N., R. 11 W.; USGS Douds, Iowa, Topographic Quadrangle; latitude 40 degrees 49 minutes 41 seconds N. and longitude 92 degrees 05 minutes 39 seconds W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak thin platy structure parting to weak fine granular; friable; few fine roots; common very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; abrupt smooth boundary.

E—6 to 12 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak thin platy structure parting to moderate very fine subangular blocky; friable; few fine roots; common prominent pale brown (10YR 6/3) silt coatings on faces of peds; neutral; clear smooth boundary.

Bt1—12 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) redox concentrations; strongly acid; clear smooth boundary.

Bt2—15 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) redox concentrations; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—21 to 34 inches; dark yellowish brown (10YR 4/4) silty clay; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct clay films on faces of peds; many fine and medium strong brown (7.5YR 5/6) redox concentrations; many medium prominent grayish brown (2.5Y 5/2) redox depletions; few fine black irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—34 to 47 inches; grayish brown (2.5Y 5/2) silty clay; weak fine and medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/4), yellowish red (5YR 4/6), and strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt5—47 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/4), yellowish red (5YR 4/6), and strong brown (7.5YR 5/8) redox concentrations; few fine black irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 48 to 70 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam or silty clay loam

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—silt loam

Bt horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay loam

Bt horizon (middle part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—silty clay

Bt horizon (lower part):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6

132B—Weller silt loam, 2 to 5 percent slopes

Composition

Weller and similar soils: 100 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

132C—Weller silt loam, 5 to 9 percent slopes

Composition

Weller and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes

Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Keswick and similar soils
- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land (fig. 12)

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

132C2—Weller silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Weller and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Keswick and similar soils
- Ashgrove and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

832B—Weller silt loam, bench, 2 to 5 percent slopes

Composition

Weller and similar soils: 100 percent

Setting

Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes

Figure 12.—A stand of hardwood timber in an area of Weller silt loam, 5 to 9 percent slopes.

Slope range: 2 to 5 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.5 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

832C—Weller silt loam, bench, 5 to 9 percent slopes

Composition

Weller and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silt loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.6 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

832C2—Weller silty clay loam, bench, 5 to 9 percent slopes, moderately eroded

Composition

Weller and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope range: 5 to 9 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

832D2—Weller silty clay loam, bench, 9 to 14 percent slopes, moderately eroded

Composition

Weller and similar soils: About 90 percent
Inclusions: About 10 percent

Setting

Landform: Stream terraces
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes
Slope range: 9 to 14 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 10.2 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Inclusions

- Galland and similar soils
- Douds and similar soils

Major Uses of the Unit

- Cropland
- Hayland
- Pasture
- Forest land

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section
- “Forest Land” section

Zook Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains and upland drainageways
Parent material: Alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Zook silty clay loam, 0 to 2 percent slopes, rarely flooded, 1,720 feet north and 120 feet east of the center of sec. 7, T. 70 N., R. 11 W.; USGS Eldon, Iowa, Topographic Quadrangle; latitude 40 degrees 53 minutes 01 second N. and longitude 92 degrees 10 minutes 06 seconds W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

A1—7 to 19 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

A2—19 to 27 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

A3—27 to 37 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate fine and medium angular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.

Bg—37 to 60 inches; dark gray (5Y 4/1) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; many prominent very dark gray (5Y 3/1) organic coatings on faces of peds; neutral; diffuse smooth boundary.

Cg—60 to 80 inches; gray (5Y 5/1) silt loam; massive; friable; many fine prominent yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/8) redox concentrations; neutral.

Range in Characteristics

Thickness of the solum: 36 to 60 inches
Thickness of the mollic epipedon: 36 to 50 inches

Ap horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam

A horizon:
Hue—10YR or N
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silty clay

Bg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—2 to 5
Chroma—1
Texture—silty clay or silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—2 to 5
Chroma—1
Texture—silty clay, silty clay loam, or silt loam

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

Composition

Zook and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Alluvium
Flooding frequency: Occasional
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.1 inches (high)
Content of organic matter in the surface layer: About 6 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

3054—Zook silty clay loam, 0 to 2 percent slopes, rarely flooded

Composition

Zook and similar soils: 100 percent

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Component Description

Texture of the surface layer: Silty clay loam
Depth to bedrock: More than 60 inches
Drainage class: Poorly drained
Dominant parent material: Alluvium
Flooding frequency: Rare
Depth to the water table: 1 to 3 feet
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 10.1 inches (high)
Content of organic matter in the surface layer: About 6 percent (high)

A typical soil series description with range in characteristics is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the “Soil Properties” section in Part II of this publication.

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

For general and detailed information concerning these uses, see Part II of this publication:

- “Agronomy” section

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

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.

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.

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

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

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

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope (fig. 13). In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal till. Compact glacial till deposited beneath the ice.

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

Base slope. A geomorphic component of hills (fig. 13) 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).

Beach deposits. Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a post-glacial or glacial lake.

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 (structural). A platformlike, nearly level to gently inclined erosional surface developed in resistant strata in areas where valleys are cut in alternating strong and weak layers that are essentially horizontal.

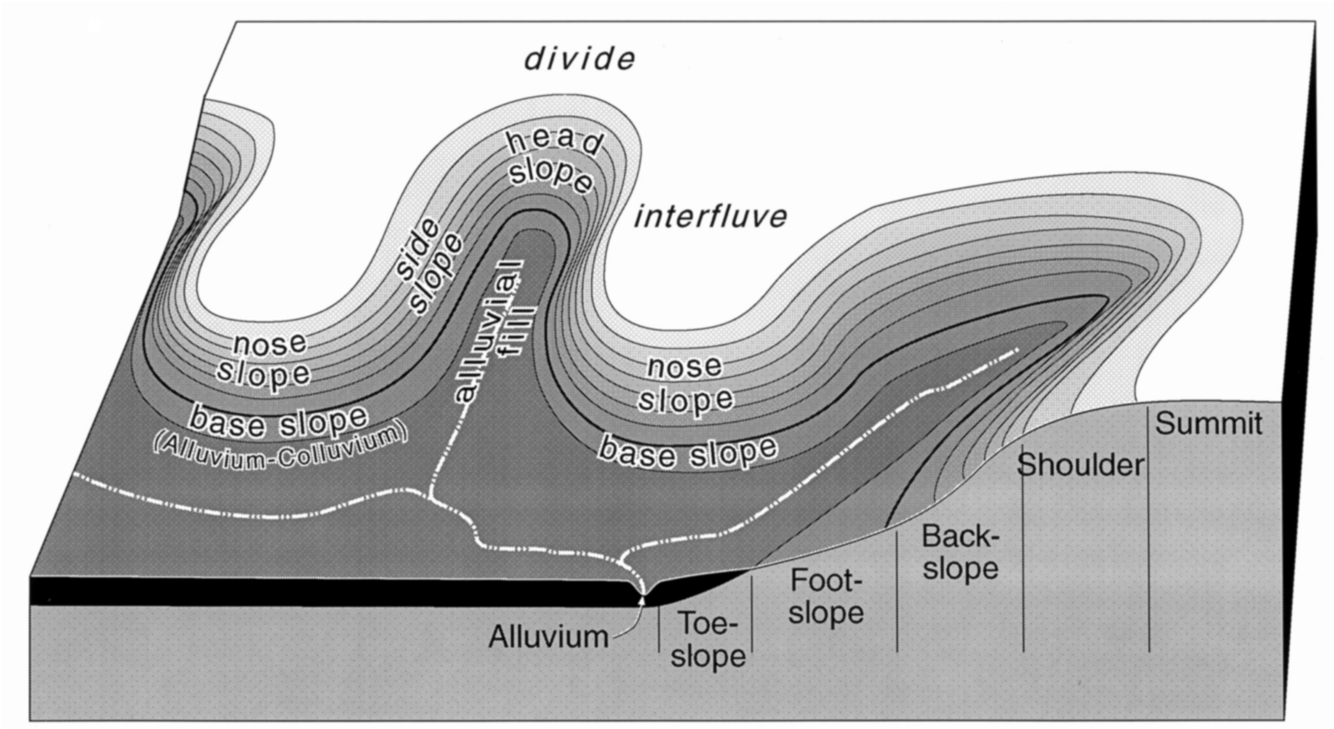

Figure 13.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).

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.

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

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

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

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

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.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

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.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

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

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

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

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.

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

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

Divide. (a) The line of separation, or (b) the summit area, or narrow tract of higher ground that constitutes the watershed boundary between two adjacent drainage basins (fig. 13); it divides the surface waters that flow naturally in one direction from those that flow in the opposite direction.

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.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

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.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

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.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

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

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

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

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

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.

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

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

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 (fig. 13). 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.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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

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

Geomorphology. The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and the history of geologic changes as recorded by these surface features. The term is especially applied to the genetic interpretation of landforms.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

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

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

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

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

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

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

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

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

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway (fig. 13). 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-chroma zones. Zones having chroma of 3 or more. Typical color in areas of iron concentrations.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

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

O horizon.—An organic layer of fresh and decaying plant residue.

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

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

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

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material.

The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

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

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

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

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Ice-walled lake plain. A relict surface marking the floor of an extinct lake basin that was formed on solid ground and surrounded by stagnant ice in a stable or unstable superglacial environment on stagnation moraines. As the ice melted, the lake plain became perched above the adjacent landscape. The lake plain is well sorted, generally fine textured, stratified deposits.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

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.

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 (fig. 13).

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.

Iron concentrations. High-chroma zones having a high content of iron and manganese oxide because of chemical oxidation and accumulation, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic concentration.

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.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kame moraine. An end moraine that contains numerous kames. A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

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

Lake bed. The bottom of a lake; a lake basin.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lakeshore. A narrow strip of land in contact with or bordering a lake; especially the beach of a lake.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

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

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

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

Low-chroma zones. Zones having chroma of 2 or less. Typical color in areas of iron depletions.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

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

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

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 scroll. One of a series of long, parallel, close fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

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

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

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

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

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

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

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

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

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

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

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside (fig. 13). 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

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

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.

Parts per million (ppm). The concentration of a substance in the soil, such as phosphorus or potassium, in one million parts of air-dried soil on a weight per weight basis.

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.

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

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

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

Phosphorus. The amount of phosphorus available to plants at a depth of 30 to 42 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available phosphorus are:

Very low	less than 7.5 ppm
Low	7.5 to 13.0 ppm
Medium	13.0 to 22.5 ppm
High	more than 22.5 ppm

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

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

Pitted outwash plain. An outwash plain marked by many irregular depressions, such as kettles, shallow pits, and potholes, which formed by melting of incorporated ice masses.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

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

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

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

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.

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

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

Potassium. The amount of potassium available to plants at a depth of 12 to 24 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available potassium are:

Very low	less than 50 ppm
Low	50 to 79 ppm
Medium	79 to 125 ppm
High	more than 125 ppm

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.

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

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.

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

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

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

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

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

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

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 (fig. 13). 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 (fig. 13). The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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

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

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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

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.

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

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

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

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

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

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.

Stagnation moraine. A body of drift released by the melting of a glacier that ceased flowing. Commonly but not always occurs near ice margins; composed of till, ice-contact stratified drift, and small areas of glacial lake sediment. Typical landforms are knob-and-kettle topography, locally including ice-walled lake plains.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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

Stream terrace. A platform or 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 stage 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.

Summit. The topographically highest position of a hillslope (fig. 13). 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.

Swale. A slight depression in the midst of generally level land. A shallow depression in an undulating ground moraine caused by uneven glacial deposition.

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

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field 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 (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lakeshore, or seashore. The term is usually applied to both the relatively flat summit surface (tread), cut or built by stream or wave action, and the steeper descending slope (scarp or riser), graded to a lower base level of erosion.

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

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

Till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

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 (fig. 13). Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

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

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

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.

United States
Department of
Agriculture

Natural
Resources
Conservation
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In cooperation with Iowa
Agriculture and Home
Economics Experiment
Station; Cooperative
Extension Service, Iowa
State University; and
Division of Soil
Conservation, Iowa
Department of Agriculture
and Land Stewardship

Soil Survey of Van Buren County, Iowa

Part II

How To Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map units in the area on the color-coded map legend, then refer to the section **General Soil Map Units** in Part I of this survey for a general description of the soils in your area.

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** or the **Numerical Index to Map Units** in Part I of this survey, which lists the map units and shows the page where each map unit is described.

The **Contents** in Part II shows which table has data on a specific land use for each detailed soil map unit. Also, see the **Contents** in Part I and Part II for other 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 1993. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This survey was made cooperatively by the Natural Resources Conservation Service; the Iowa Agriculture and Home Economics Experiment Station; the Cooperative Extension Service, Iowa State University; and the Division of Soil Conservation, Iowa Department of Agriculture and Land Stewardship. The survey is part of the technical assistance furnished to the Van Buren County Soil and Water Conservation District. Funds appropriated by Van Buren County were used to defray part of the cost of the survey.

Cover: An erosion-control structure in an area of the Kniffin-Rinda-Gara association in Van Buren County.

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

Contents

Soil Survey of
Van Buren County, Iowa

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.

This part of the soil survey includes interpretations for various uses of the soils and data on soil properties. This information 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; and for 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.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

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.

At the end of this section, table 1, table 2, and table 3 provide information about the climate in the survey area. The classification of the soils in the survey area is shown in table 4, and the extent of the soils is shown in table 5.

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Keosauqua State Park, Iowa)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	32.8	12.9	22.9	61	-20	1	1.35	0.50	2.05	3	7.1
February---	38.4	17.6	28.0	67	-15	2	1.11	.60	1.56	3	6.0
March------	51.0	29.1	40.1	81	2	42	2.75	1.46	3.88	6	3.6
April------	64.8	40.5	52.7	88	19	161	3.68	1.91	5.23	7	1.1
May--------	75.4	50.3	62.9	91	31	402	4.10	2.34	5.65	7	.0
June-------	84.0	59.5	71.8	97	42	653	4.11	2.09	5.87	6	.0
July-------	88.3	64.4	76.3	101	48	809	4.97	2.48	7.13	6	.0
August-----	86.0	61.7	73.9	100	45	740	3.82	1.69	5.65	6	.0
September--	78.3	53.8	66.1	95	32	484	4.59	1.89	6.87	6	.0
October----	67.2	42.6	54.9	88	21	207	3.16	1.15	4.83	5	.2
November---	51.5	31.5	41.5	76	7	38	2.43	.80	3.76	5	1.8
December---	36.5	18.7	27.6	65	-13	3	1.95	1.02	2.77	4	6.1
Yearly:											
Average---	62.9	40.2	51.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	102	-21	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,541	38.02	30.69	44.19	64	25.9

* 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 Keosauqua State Park, Iowa)

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. 13	Apr. 24	May 8
2 years in 10 later than--	Apr. 9	Apr. 19	May 4
5 years in 10 later than--	Apr. 1	Apr. 10	Apr. 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 13	Oct. 2	Sept. 21
2 years in 10 earlier than--	Oct. 19	Oct. 8	Sept. 27
5 years in 10 earlier than--	Oct. 30	Oct. 18	Oct. 8

Table 3.--Growing Season

(Recorded in the period 1961-90 at Keosauqua State Park, Iowa)

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	189	166	145
8 years in 10	196	174	152
5 years in 10	210	190	165
2 years in 10	224	206	177
1 year in 10	231	214	184

Table 4.--Classification of the Soils

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

Soil name	Family or higher taxonomic class
Adco	Vertic Albaqualfs, fine, montmorillonitic, mesic
Armstrong	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Ashgrove	Aeric Chromic Vertic Epiaqualfs, fine, montmorillonitic, mesic
Appanoose	Vertic Albaqualfs, fine, montmorillonitic, mesic
Aquents	Aquents
*Arispe	Aquertic Argiudolls, fine, montmorillonitic, mesic
Beckwith	Chromic Vertic Albaqualfs, fine, montmorillonitic, mesic
Belinda	Vertic Albaqualfs, fine, montmorillonitic, mesic
Bentonsport	Typic Hapludolls, loamy-skeletal, mixed, mesic
Bucklick	Typic Hapludalfs, fine, mixed, mesic
Bucknell	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Cantril	Udollic Ochraqualfs, fine-loamy, mixed, mesic
Carlow	Vertic Endoaquolls, fine, montmorillonitic, mesic
Chequest	Vertic Endoaquolls, fine, montmorillonitic, mesic
*Clarinda	Vertic Argiaquolls, fine, montmorillonitic, mesic
Clinton	Chromic Vertic Hapludalfs, fine, montmorillonitic, mesic
Colo	Cumulic Endoaquolls, fine-silty, mixed, mesic
Coppock	Mollic Endoaqualfs, fine-silty, mixed, mesic
Creal	Aeric Endoaqualfs, fine-silty, mixed, mesic
Douds	Typic Hapludalfs, fine-loamy, mixed, mesic
Edina	Vertic Argialbolls, fine, montmorillonitic, mesic
Galland	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Gara	Mollic Hapludalfs, fine-loamy, mixed, mesic
Gorin	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Gosport	Typic Dystrochrepts, fine, illitic, mesic
Grundy	Aquertic Argiudolls, fine, montmorillonitic, mesic
Haig	Vertic Argiaquolls, fine, montmorillonitic, mesic
Hoopeston	Aquic Hapludolls, coarse-loamy, mixed, mesic
Keosauqua	Typic Argiudolls, fine-loamy, mixed, mesic
Keswick	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Klum	Mollic Udifluvents, coarse-loamy, mixed, nonacid, mesic
Kniffin	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Lawson	Cumulic Hapludolls, fine-silty, mixed, mesic
Lindley	Typic Hapludalfs, fine-loamy, mixed, mesic
Mt. Sterling	Aeric Fluvaquents, fine-silty, mixed, nonacid, mesic
Mystic	Aquertic Hapludalfs, fine, montmorillonitic, mesic
Nodaway	Mollic Udifluvents, fine-silty, mixed, nonacid, mesic
Nordness	Lithic Hapludalfs, loamy, mixed, mesic
Okaw	Vertic Albaqualfs, fine, montmorillonitic, mesic
Olmitz	Cumulic Hapludolls, fine-loamy, mixed, mesic
Orthents	Typic Udorthents, loamy, mixed, mesic
Perks	Typic Udipsamments, mixed, mesic
Pershing	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Racoon	Typic Endoaqualfs, fine-silty, mixed, mesic
Rathbun	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Reedscreek	Mollic Udifluvents, loamy-skeletal, mixed, nonacid, mesic
Richwood	Typic Argiudolls, fine-silty, mixed, mesic
Rinda	Vertic Epiaqualfs, fine, montmorillonitic, mesic
Seymour	Aquertic Argiudolls, fine, montmorillonitic, mesic
Tuskeego	Mollic Endoaqualfs, fine, montmorillonitic, mesic
Vesser	Argiaquic Argialbolls, fine-silty, mixed, mesic
Wabash	Vertic Endoaquolls, fine, montmorillonitic, mesic
Weller	Aquertic Chromic Hapludalfs, fine, montmorillonitic, mesic
Zook	Cumulic Vertic Endoaquolls, fine, montmorillonitic, mesic

Table 5.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
13B	Olmitz-Vesser-Zook complex, 0 to 5 percent slopes	3,540	1.1
23C2	Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded	1,669	0.5
51	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded	2,483	0.8
51+	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	581	0.2
51B	Vesser silt loam, 2 to 5 percent slopes, rarely flooded	547	0.2
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	679	0.2
58D	Douds loam, 9 to 14 percent slopes	11	*
58D2	Douds loam, 9 to 14 percent slopes, moderately eroded	1,042	0.3
58E2	Douds loam, 14 to 18 percent slopes, moderately eroded	1,014	0.3
58F2	Douds loam, 18 to 25 percent slopes, moderately eroded	201	0.1
58G	Douds loam, 25 to 40 percent slopes	941	0.3
65D	Lindley loam, 9 to 14 percent slopes	230	0.1
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	2,661	0.9
65E	Lindley loam, 14 to 18 percent slopes	1,811	0.6
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	11,747	3.8
65F2	Lindley loam, 18 to 25 percent slopes, moderately eroded	6,141	2.0
65G	Lindley loam, 25 to 40 percent slopes	13,876	4.4
80B	Clinton silt loam, 2 to 5 percent slopes	85	*
80C	Clinton silt loam, 5 to 9 percent slopes	198	0.1
80C2	Clinton silty clay loam, 5 to 9 percent slopes, moderately eroded	432	0.1
80D	Clinton silt loam, 9 to 14 percent slopes	438	0.1
80D2	Clinton silty clay loam, 9 to 14 percent slopes, moderately eroded	851	0.3
130	Belinda silt loam, 0 to 2 percent slopes	4,354	1.4
131B	Pershing silt loam, 2 to 5 percent slopes	6,349	2.0
131B2	Pershing silty clay loam, 2 to 5 percent slopes, moderately eroded	1,460	0.5
131C	Pershing silt loam, 5 to 9 percent slopes	339	0.1
131C2	Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded	6,232	2.0
132B	Weller silt loam, 2 to 5 percent slopes	6,730	2.2
132C	Weller silt loam, 5 to 9 percent slopes	2,715	0.9
132C2	Weller silty clay loam, 5 to 9 percent slopes, moderately eroded	15,743	5.0
139	Perks loamy sand, 0 to 2 percent slopes, occasionally flooded	51	*
139B	Perks loamy sand, 2 to 5 percent slopes, rarely flooded	361	0.1
172	Wabash silty clay, 0 to 2 percent slopes, occasionally flooded	1,146	0.4
173	Hoopeston sandy loam, 0 to 2 percent slopes	414	0.1
179D2	Gara clay loam, 9 to 14 percent slopes, moderately eroded	3,982	1.3
179E2	Gara clay loam, 14 to 18 percent slopes, moderately eroded	2,940	0.9
197	Reedscreek loam, 0 to 3 percent slopes, occasionally flooded	298	0.1
208	Klum fine sandy loam, 0 to 2 percent slopes, occasionally flooded	751	0.2
211	Edina silt loam, depressional, 0 to 1 percent slopes	921	0.3
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded	6,913	2.2
222C2	Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	3,289	1.1
223C2	Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded	11,075	3.5
231	Edina silt loam, 0 to 2 percent slopes	10,283	3.3
260	Beckwith silt loam, 0 to 2 percent slopes	1,786	0.6
261	Appanoose silt loam, 0 to 2 percent slopes	2,314	0.7
263	Okaw silt loam, 0 to 2 percent slopes, rarely flooded	70	*
273B	Olmitz loam, 2 to 5 percent slopes	209	0.1
273C	Olmitz loam, 5 to 9 percent slopes	50	*
312B	Seymour silt loam, 2 to 5 percent slopes	4,070	1.3
312B2	Seymour silty clay loam, 2 to 5 percent slopes, moderately eroded	2,128	0.7
313D2	Gosport silty clay loam, 9 to 14 percent slopes, moderately eroded	452	0.1
313E2	Gosport silty clay loam, 14 to 18 percent slopes, moderately eroded	1,242	0.4
313F2	Gosport silty clay loam, 18 to 25 percent slopes, moderately eroded	696	0.2
313G	Gosport silt loam, 25 to 40 percent slopes	1,654	0.5
315	Nodaway-Klum-Perks complex, 0 to 3 percent slopes, occasionally flooded	1,885	0.6
362	Haig silt loam, 0 to 2 percent slopes	17,377	5.6
363	Haig silty clay loam, 0 to 1 percent slopes	1,309	0.4
364B	Grundy silt loam, 2 to 5 percent slopes	7,548	2.4
364B2	Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded	3,126	0.1
423D2	Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded	3,668	1.2
424D2	Lindley-Keswick complex, 9 to 14 percent slopes, moderately eroded	3,503	1.1
424E2	Lindley-Keswick complex, 14 to 18 percent slopes, moderately eroded	1,780	0.6
425D	Keswick loam, 9 to 14 percent slopes	2,340	0.7

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
425D2	Keswick clay loam, 9 to 14 percent slopes, moderately eroded	5,191	1.7
432C2	Gorin silty clay loam, 3 to 9 percent slopes, moderately eroded	118	*
432D	Gorin silt loam, 9 to 14 percent slopes	1,329	0.4
432D2	Gorin silty clay loam, 9 to 14 percent slopes, moderately eroded	8,825	2.8
453	Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded	149	*
460	Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded	618	0.2
520	Coppock silt loam, 0 to 2 percent slopes, occasionally flooded	1,703	0.5
520B	Coppock silt loam, 2 to 5 percent slopes, rarely flooded	1,686	0.5
531B	Kniffin silt loam, 2 to 5 percent slopes	6,706	2.1
531B2	Kniffin silty clay loam, 2 to 5 percent slopes, moderately eroded	1,927	0.6
531C2	Kniffin silty clay loam, 5 to 9 percent slopes, moderately eroded	9,676	3.1
532B	Rathbun silt loam, 2 to 5 percent slopes	1,629	0.5
532C	Rathbun silt loam, 5 to 9 percent slopes	1,247	0.4
532C2	Rathbun silty clay loam, 5 to 9 percent slopes, moderately eroded	5,919	1.9
534	Carlow silty clay, 0 to 2 percent slopes, occasionally flooded	603	0.2
592D2	Mystic clay loam, 9 to 14 percent slopes, moderately eroded	159	0.1
594D2	Galland loam, 9 to 14 percent slopes, moderately eroded	1,156	0.4
598G	Bucklick silt loam, 18 to 35 percent slopes	4	*
599G	Nordness-Gosport complex, 25 to 40 percent slopes	794	0.3
632B	Adco silt loam, 1 to 5 percent slopes	83	*
699G	Nordness-Bentonsport complex, 25 to 40 percent slopes	1,523	0.5
719B	Creal silt loam, 2 to 5 percent slopes, rarely flooded	346	0.1
720	Racoon silt loam, 0 to 2 percent slopes, occasionally flooded	173	0.1
729	Nodaway-Coppock complex, 0 to 2 percent slopes, occasionally flooded	578	0.2
730B	Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes	8,283	2.6
792D2	Armstrong clay loam, 9 to 14 percent slopes, moderately eroded	2,718	0.9
795C2	Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded	1,934	0.6
795D	Ashgrove silty clay loam, 9 to 14 percent slopes	674	0.2
795D2	Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded	8,309	2.7
831B	Pershing silt loam, bench, 2 to 5 percent slopes	1,731	0.6
831C2	Pershing silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	1,129	0.4
832B	Weller silt loam, bench, 2 to 5 percent slopes	3,868	1.2
832C	Weller silt loam, bench, 5 to 9 percent slopes	167	0.1
832C2	Weller silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	5,663	1.8
832D2	Weller silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	1,506	0.5
880B	Clinton silt loam, bench, 2 to 5 percent slopes	1,100	0.4
880C	Clinton silt loam, bench, 5 to 9 percent slopes	366	0.1
880C2	Clinton silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	1,682	0.5
880D	Clinton silt loam, bench, 9 to 14 percent slopes	252	0.1
880D2	Clinton silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	1,334	0.4
977	Richwood silt loam, 0 to 2 percent slopes	718	0.2
993D2	Gara-Armstrong complex, 9 to 14 percent slopes, moderately eroded	1,379	0.4
994D2	Galland-Douds complex, 9 to 14 percent slopes, moderately eroded	1,506	0.5
994E2	Galland-Douds complex, 14 to 18 percent slopes, moderately eroded	1,412	0.5
1130	Belinda silt loam, bench, 0 to 2 percent slopes	2,232	0.7
1260	Beckwith silt loam, bench, 0 to 2 percent slopes	1,819	0.6
1715	Nodaway-Vesser-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	2,638	0.8
1977	Keosauqua loam, 1 to 3 percent slopes	1,346	0.4
3051	Vesser silt loam, 0 to 2 percent slopes, rarely flooded	356	0.1
3054	Zook silty clay loam, 0 to 2 percent slopes, rarely flooded	231	0.1
3133	Colo silty clay loam, 0 to 2 percent slopes, rarely flooded	406	0.1
3139	Perks loamy sand, 0 to 2 percent slopes, rarely flooded	438	0.1
3208	Klum fine sandy loam, 0 to 2 percent slopes, rarely flooded	385	0.1
3220	Nodaway silt loam, 0 to 2 percent slopes, rarely flooded	1,666	0.5
3315	Nodaway-Klum-Perks complex, 0 to 3 percent slopes, rarely flooded	380	0.1
3484	Lawson silt loam, 0 to 2 percent slopes, rarely flooded	385	0.1
3520	Coppock silt loam, 0 to 2 percent slopes, rarely flooded	839	0.3
3587	Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded	170	0.1
3720	Racoon silt loam, 0 to 2 percent slopes, rarely flooded	80	*
5010	Pits, sand and gravel	172	0.1
5020	Pits and Dumps	268	0.1
5030	Pits, limestone quarries	405	0.1

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
5040	Orthents, loamy	300	0.1
5047	Aquents, ponded, occasionally flooded	10	*
AW	Animal waste	6	*
SL	Sewage lagoon	47	*
W	Water	5,617	1.8
	Total	312,800	100.0

* Less than 0.1 percent.

Agronomy

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

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Management Considerations

The management concerns affecting the use of the soils in the survey area for crops are shown in table 6. The main concerns in managing nonirrigated cropland are conserving moisture, controlling wind erosion and water erosion, and maintaining soil fertility.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water infiltration rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control ***wind erosion*** and ***water erosion***. Conservation tillage, stripcropping, field windbreaks, contour farming, conservation cropping systems, crop residue management, terraces, diversions, and grassed waterways (fig. 14) help to prevent excessive soil loss.

Measures that are effective in maintaining ***soil fertility*** include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the considerations shown in the table cannot be easily overcome. These are ***channels, flooding, gullies,*** and ***ponding***.

Additional considerations are as follows:

Lime content, limited available water capacity, limited organic matter content, potential poor tilth and compaction, and ***restricted permeability***.—These limitations can be minimized by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems. Also, crops may respond well to additions of phosphate fertilizer to soils that have a high content of lime.

Potential for ground-water contamination.—The proper use of nutrients and pesticides can reduce the risk of ground-water contamination.

Potential for surface-water contamination.—The risk of surface-water contamination can be reduced by the proper use of nutrients and pesticides and by conservation farming practices that reduce the runoff rate.

Surface crusting.—This limitation retards seeding development after periods of heavy rainfall.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Surface stones.—Stones or boulders on or near the surface can hinder normal tillage unless they are removed.

Salt content.—In areas where this is a limitation, only salt-tolerant crops should be grown.

On irrigated soils the main management concerns are ***efficient water use, nutrient management, control of erosion, pest and weed control,*** and ***timely planting and harvesting*** for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes

Figure 14.—Wide, gently sloping grassed waterways are effective in controlling water erosion in an area of Grundy silt loam, 2 to 5 percent slopes, and Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded.

erosion. Also, it can create drainage problems, raise the water table, and increase soil salinity.

Explanation of Criteria

Acid soil.—The pH is less than 6.1.

Channeled.—The word “channeled” is included in the map unit name.

Dense layer.—The bulk density is 1.80 g/cc or greater within the soil profile.

Depth to rock.—The depth to bedrock is less than 40 inches.

Excessive permeability.—Permeability is 6 inches per hour or more within the soil profile.

Flooding.—Flooding is occasional or frequent.

Gullied.—The word “gullied” is included in the map unit name.

High organic matter content.—The surface layer has more than 20 percent organic matter.

Lime content.—The pH is 7.4 or more in the surface layer, or the wind erodibility group is 4L.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Limited organic matter content.—The content of organic matter is 2 percent or less in the surface layer.

Ponding.—Ponding duration is assigned to the map unit component. The water table is above the surface.

Potential poor tilth and compaction.—The content of clay is 27 percent or more in the surface layer.

Potential for ground-water contamination (by nutrients or pesticides).—Depth to the water table is 4 feet or less, the permeability of any layer is more than 6.0 inches per hour, or the depth to bedrock is less than 60 inches.

Potential for surface-water contamination (by nutrients or pesticides).—The map unit component is occasionally flooded or frequently flooded, is subject to ponding, is assigned to hydrologic group C or D and has a slope of more than 2 percent, is assigned to hydrologic group A and has a slope of more than 6 percent, or is assigned to hydrologic group B, has a slope of 3 percent or more, and has a K factor of more than 0.17.

Previously eroded.—The word “eroded” is included in the map unit name.

Restricted permeability.—Permeability is less than 0.06 inch per hour within the soil profile.

Salt content.—The electrical conductivity is 4 or more in the surface layer or 8 or more within a depth of 30 inches.

Slope (equipment limitation).—The slope is more than 15 percent.

Surface rock fragments (equipment limitation).—The terms describing the texture of the surface layer include any rock fragment modifier, except for gravelly, channery, stony, very stony, extremely stony, bouldery, very bouldery, and extremely bouldery.

Surface stones (equipment limitation).—The word “stony” or “bouldery” is included in the map unit name or in the description of the surface layer.

Water erosion.—Either the slope is 6 percent or more, or the slope is more than 3 percent and less than 6 percent and the surface layer is not sandy.

Water table.—A water table is within 2.5 feet of the surface.

Wind erosion.—The wind erodibility group is 1, 2, 3, or 4L.

Agronomic Considerations

Inherent subsoil fertility levels, in terms of potential plant-available phosphorus and potassium, are described in table 7. Soil tests of the tilled layer are used to determine the most profitable rates of fertilizers for various crops. Nutrient levels in the subsurface layers do influence crop yields, particularly in the drier seasons when the nutrients in the dry tilled layer become temporarily unavailable to plants. The availability of nutrients in the tilled layer and the subsoil influences the relative uptake from the two zones in the soil profile. Fertilizer recommendations based on soil tests of the tilled layer may be adjusted by the average nutrient levels in the subsoil of each soil series. Fertilizer recommendations are adjusted for subsoil nutrient levels. The ratings given in the table are described as follows:

Subsoil phosphorus.—The amount of plant-available phosphorus in the subsoil expressed in parts per million and based on the weighted average of air-dried soil samples from the subsoil (at a depth of 30 to 42 inches). (The value listed for complexes is the most limiting value of the soils identified in the map unit name.) A rating of ***very low*** indicates less than 7.5 ppm; ***low***, 7.5 to 13.0 ppm; ***medium***, 13.0 to 22.5 ppm; and ***high***, more than 22.5 ppm.

Subsoil potassium.—The amount of plant-available potassium in the subsoil expressed in parts per million and based on the weighted average of air-dried soil samples from the subsoil (at a depth of 12 to 24 inches). (The value listed for complexes is the most limiting value of the soils identified in the map unit name.) A rating of ***very low minus*** indicates less than 25 ppm; ***very low plus***, 25 to 50 ppm; ***low***, 50 to 79 ppm; ***medium***, 79 to 125 ppm; and ***high***, more than 125 ppm.

Tilth rating.—The ratings of ***good, fair, poor,*** and ***very poor*** are based on clay content, organic matter content, drainage class, sand size, and sand content.

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 take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils generally are grouped at three levels—capability class, subclass, and unit (USDA, 1961). These categories indicate the degree and kinds of limitations affecting mechanized farming systems that produce the more commonly grown field crops, such as corn, small grain, cotton, hay, and field-grown vegetables. Only class and subclass are used in this survey.

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.

If properly managed, soils in classes 1, 2, 3, and 4 are suitable for the mechanized production of commonly grown field crops and for pasture and woodland. The degree of the soil limitations affecting the production of cultivated crops increases progressively from class 1 to class 4. The limitations can affect levels of production and the risk of permanent soil deterioration caused by erosion and other factors.

Soils in classes 5, 6, and 7 are generally not suited to the mechanized production of commonly grown field crops without special management, but they are suitable for plants that provide a permanent cover, such as grasses and trees. The severity of the soil limitations affecting crops increases progressively from class 5 to class 7.

Areas in class 8 are generally not suitable for crops, pasture, or woodland without a level of management that is impractical. These areas may have potential for other uses, such as recreational facilities and wildlife habitat.

Capability subclasses identify the dominant kind of limitation in the 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 a 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.

There are no subclasses in class 1 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 mainly to pasture, woodland, wildlife habitat, or recreation.

The capability classification of the soils in the survey area is given in tables 8 and 9 at the end of this section.

Corn Suitability Rating (CSR)

The corn suitability rating for the soils in the survey area is given in table 8. Corn suitability ratings provide a relative ranking of all soils mapped in the State of Iowa based on their potential to be utilized for the intensive production of row crops. The CSR is an index that can be used to rate the potential production of one soil compared with another over a period of time. The CSR considers average weather conditions and frequency of use of the soil for row crops. Ratings range from 100 for soils that have no physical limitations, are on minimal slopes, and can be continuously row cropped to as low as 5 for soils that have severe limitations affecting the production of row crops. The ratings listed in this table assume adequate management, natural weather conditions (no irrigation), artificial drainage where required, and no land leveling or terracing. They also assume that soils in the lower positions on the landscape are not affected by frequent damaging floods. The weighted CSR for a given field can be modified by the occurrence of sandy spots, local deposits, rock and gravel outcrops, field boundaries, and noncrossable drainageways. Even though predicted average yields will change with time, the CSR's are expected to remain relatively constant in relation to one another.

The CSR's in Van Buren County range from 95 for Lawson silt loam, 0 to 2 percent slopes, rarely flooded, to 5 for several map units, including Lindley loam, 25 to 40 percent slopes. No ratings are provided for miscellaneous areas because of the variability of properties and uses of these areas.

Crop Yield Estimates

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 8 and table 9. In any given year, yields may be higher or lower than those indicated in the tables because of variations in rainfall and other climatic factors. The land capability classification of the soils in the survey area also is shown in the tables.

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage (fig. 15), erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

Crops other than those shown in the tables 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

Figure 15.—Corn in an area of Haig silt loam, 0 to 2 percent slopes. A drainage management system improves production in areas of this soil.

Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Pasture and Hayland Interpretations

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Some of the yield estimates in table 9 are provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about forage yields other than those shown in table 9.

Prime Farmland

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. An adequate moisture supply and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They either are used for food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils commonly receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable, and the level of acidity or alkalinity and the content of salts and sodium are acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods, and they are not frequently flooded during the growing season or are protected from flooding. Slopes range mainly from 0 to 6 percent.

Soils that have a high water table or are subject to flooding may qualify as prime farmland where these limitations are overcome by drainage measures or flood control. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information about the criteria for prime farmland can be obtained at the local office of the Natural Resources Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 70,392 acres, or nearly 23 percent of the survey area, meets the requirements for prime farmland.

The map units in the survey area that meet the requirements for prime farmland are listed in table 10. This list does not constitute a recommendation for a particular land use. On some soils included in the table, measures that overcome limitations are needed. The need for these measures is indicated in parentheses after the map unit name. The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Soil Series and Detailed Soil Map Units" in Part I of this survey.

Erosion Factors

Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices. The erosion factors for the soils in the survey area are listed in table 21.

Soil Erodibility (K) Factor

The soil erodibility (K) factor indicates the susceptibility of a soil to sheet and rill erosion by water. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt plus very fine sand, the content of sand coarser than very fine sand, the content of organic matter, soil structure, and permeability.

Fragment-Free Soil Erodibility (Kf) Factor

This is one of the factors used in the revised Universal Soil Loss Equation. It shows the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Soil-Loss Tolerance (T) Factor

The soil-loss tolerance (T) factor is an estimate of the maximum annual rate of soil erosion that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind Erodibility Groups

Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index (I) factor is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter. The wind erodibility groups and wind erodibility index numbers are listed in table 21.

Additional information about wind erodibility groups and K, Kf, T, and I factors can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

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. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

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.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and have survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in this table 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 local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a nursery.

Windbreak Suitability Groups

Windbreak suitability groups consist of soils in which the kinds and degrees of the hazards and limitations that affect the survival and growth of trees and shrubs in windbreaks are about the same. The windbreak suitability groups for the soils in the survey area are listed in table 12. The following paragraphs explain the characteristics of the soils in each group.

Group 1 consists of soils that are somewhat poorly drained or moderately well drained, are rapidly permeable to moderately slowly permeable, and do not have free carbonates in the upper 20 inches.

Group 1K consists of soils that are somewhat poorly drained or moderately well drained, are rapidly permeable to moderately slowly permeable, and have free carbonates within 20 inches of the surface. These soils may be very slightly saline or slightly saline (the electrical conductivity is 2 to 8).

Group 2 consists of poorly drained soils that have been artificially drained and do not have free carbonates in the upper 20 inches. Permeability varies.

Group 2K consists of poorly drained or very poorly drained soils that have been artificially drained and have free carbonates within 20 inches of the surface. Permeability varies. These soils may be very slightly saline or slightly saline (the electrical conductivity is 2 to 8).

Group 2H consists of very poorly drained soils that have been artificially drained and have more than 16 inches of organic material. Permeability varies.

Group 2W consists of very poorly drained soils that are subject to ponding and have been artificially drained. It includes soils that have an organic surface layer up to 16 inches thick. Permeability varies.

Group 3 consists of soils that are well drained or moderately well drained and are loamy or silty throughout. Permeability is moderate or moderately slow. These soils do not have free carbonates in the upper 20 inches.

Group 4 consists of soils that are well drained, moderately well drained, or somewhat poorly drained and have a silty or loamy surface layer and a clayey subsoil. Permeability is slow or very slow.

Group 4C consists of soils that are well drained, moderately well drained, or somewhat poorly drained and have a clayey surface layer and subsoil. Permeability is slow or very slow.

Group 4F consists of soils that are well drained, moderately well drained, or somewhat poorly drained and have a substratum of dense till. Permeability is slow or very slow.

Group 5 consists of soils that are excessively drained to moderately well drained and have a moderate available water capacity. These soils are dominantly fine sandy loam or sandy loam, but some are sandy in the upper part and loamy in the lower part.

Group 6G consists of excessively drained to moderately well drained soils that are loamy in the upper part and have sand or sand and gravel at a depth of 20 to 40 inches. These soils have a low or moderate available water capacity.

Group 6D consists of excessively drained to moderately well drained, loamy soils that have bedrock at a depth of 20 to 40 inches. These soils have a low or moderate available water capacity.

Group 7 consists of excessively drained to well drained soils that are dominantly loamy fine sand or coarser textured and are shallow to sand or to sand and gravel. These soils have a low available water capacity.

Group 8 consists of excessively drained to well drained, loamy soils that have free carbonates within 20 inches of the surface.

Group 9W consists of soils that are somewhat poorly drained, poorly drained, or very poorly drained and are moderately saline (the electrical conductivity is 8 to 16).

Group 10 consists of soils or miscellaneous land types that generally are not suitable for windbreaks. One or more characteristics, such as soil depth, texture, wetness, available water capacity, or slope, limit the planting, survival, or growth of trees and shrubs.

Table 6.--Cropland Management Considerations

(See text for a description of the considerations listed in this table)

Map symbol and soil name	Cropland management considerations
13B:	
Olmitz	Potential for surface-water contamination Water erosion
Vesser	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
Zook	Potential for ground-water contamination Potential poor tilth and compaction Water table
23C2:	
Arispe	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Water erosion Water table
51:	
Vesser	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
51+:	
Vesser	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
51B:	
Vesser	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
54:	
Zook	Flooding Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Water table
58D:	
Douds	Acid soil Potential for surface-water contamination Water erosion
58D2:	
Douds	Acid soil Limited organic matter content Potential for surface-water contamination Previously eroded Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
58E2:	
Douds	Acid soil Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
58F2:	
Douds	Acid soil Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
58G:	
Douds	Acid soil Potential for surface-water contamination Slope Water erosion
65D:	
Lindley	Limited organic matter content Potential for surface-water contamination Water erosion
65D2:	
Lindley	Limited organic matter content Potential for surface-water contamination Previously eroded Water erosion
65E:	
Lindley	Limited organic matter content Potential for surface-water contamination Slope Water erosion
65E2:	
Lindley	Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
65F2:	
Lindley	Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
65G:	
Lindley	Limited organic matter content Potential for surface-water contamination Slope Water erosion
80B:	
Clinton	Acid soil Potential for surface-water contamination Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
80C:	
Clinton	Acid soil Potential for surface-water contamination Water erosion
80C2:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion
80D:	
Clinton	Acid soil Potential for surface-water contamination Water erosion
80D2:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion
130:	
Belinda	Acid soil Potential for ground-water contamination Restricted permeability Water table
131B:	
Pershing	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
131B2:	
Pershing	Acid soil Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion Water table
131C:	
Pershing	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
131C2:	
Pershing	Acid soil Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
132B:	
Weller	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
132C:	
Weller	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
132C2:	
Weller	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion Water table
139:	
Perks	Excessive permeability Flooding Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Wind erosion
139B:	
Perks	Excessive permeability Limited available water capacity Limited organic matter content Potential for ground-water contamination Wind erosion
172:	
Wabash	Flooding Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Restricted permeability Water table
173:	
Hoopeston	Excessive permeability Potential for ground-water contamination Water table Wind erosion
179D2:	
Gara	Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
179E2:	
Gara	Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Slope Water erosion
197:	
Reedscreek	Flooding Lime content Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination
208:	
Klum	Flooding Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Wind erosion
211:	
Edina	Ponding Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water table
220:	
Nodaway	Flooding Potential for ground-water contamination Potential for surface-water contamination
222C2:	
Clarinda	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Water erosion Water table
223C2:	
Rinda	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Water erosion Water table
231:	
Edina	Potential for ground-water contamination Restricted permeability Water table
260:	
Beckwith	Acid soil Limited organic matter content Ponding Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
261:	
Appanoose	Acid soil Potential for ground-water contamination Restricted permeability Water table
263:	
Okaw	Acid soil Ponding Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water table
273B:	
Olmitz	Potential for surface-water contamination Water erosion
273C:	
Olmitz	Potential for surface-water contamination Water erosion
312B:	
Seymour	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
312B2:	
Seymour	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Water erosion Water table
313D2:	
Gosport	Acid soil Depth to rock Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Surface crusting Water erosion
313E2:	
Gosport	Acid soil Depth to rock Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Slope Surface crusting Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
313F2:	
Gosport	Acid soil Depth to rock Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Slope Surface crusting Water erosion
313G:	
Gosport	Acid soil Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Slope Water erosion Water table
315:	
Nodaway	Flooding Potential for ground-water contamination Potential for surface-water contamination
Klum	Flooding Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Wind erosion
Perks	Excessive permeability Flooding Limited available water capacity Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Wind erosion
362:	
Haig	Acid soil Potential for ground-water contamination Restricted permeability Water table
363:	
Haig	Acid soil Potential for ground-water contamination Potential poor tilth and compaction Restricted permeability Water table
364B:	
Grundy	Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
364B2:	
Grundy	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion Water table
423D2:	
Bucknell	Acid soil Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Water erosion Water table
424D2:	
Lindley	Limited organic matter content Potential for surface-water contamination Previously eroded Water erosion
Keswick	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Water table
424E2:	
Lindley	Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
Keswick	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Slope Water erosion Water table
425D:	
Keswick	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
425D2:	
Keswick	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
432C2:	
Gorin	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Restricted permeability Water erosion Water table
432D:	
Gorin	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
432D2:	
Gorin	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Restricted permeability Water erosion Water table
453:	
Tuskeego	Potential for ground-water contamination Restricted permeability Water table
460:	
Mt. Sterling	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
520:	
Coppock	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
520B:	
Coppock	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
531B:	
Kniffin	Acid soil Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
531B2:	
Kniffin	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Surface crusting Water erosion Water table
531C2:	
Kniffin	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Surface crusting Water erosion Water table
532B:	
Rathbun	Acid soil Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
532C:	
Rathbun	Acid soil Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
532C2:	
Rathbun	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Restricted permeability Surface crusting Water erosion Water table
534:	
Carlow	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Restricted permeability Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
592D2:	
Mystic	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion Water table
594D2:	
Galland	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Water table
598G:	
Bucklick	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Slope Water erosion
599G:	
Nordness	Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Slope Water erosion
Gosport	Acid soil Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Slope Water erosion Water table
632B:	
Adco	Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water erosion Water table
699G:	
Nordness	Depth to rock Limited available water capacity Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Slope Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
699G:	
Bentonsport	Depth to rock Lime content Potential for ground-water contamination Potential for surface-water contamination Slope Surface rock fragments Water erosion
719B:	
Creal	Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
720:	
Racoon	Acid soil Flooding Limited organic matter content Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
729:	
Nodaway	Flooding Potential for ground-water contamination Potential for surface-water contamination
Coppock	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
730B:	
Nodaway	Potential for ground-water contamination Potential for surface-water contamination Water erosion
Coppock	Acid soil Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
Cantril	Potential for ground-water contamination Potential for surface-water contamination Water erosion Water table
792D2:	
Armstrong	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Water erosion Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
795C2:	
Ashgrove	Limited organic matter content
	Potential for ground-water contamination
	Potential for surface-water contamination
	Potential poor tilth and compaction
	Previously eroded
	Restricted permeability
	Surface crusting
	Water erosion
	Water table
795D:	
Ashgrove	Potential for ground-water contamination
	Potential for surface-water contamination
	Potential poor tilth and compaction
	Restricted permeability
	Water erosion
	Water table
795D2:	
Ashgrove	Limited organic matter content
	Potential for ground-water contamination
	Potential for surface-water contamination
	Potential poor tilth and compaction
	Previously eroded
	Restricted permeability
	Surface crusting
	Water erosion
	Water table
831B:	
Pershing	Acid soil
	Potential for ground-water contamination
	Potential for surface-water contamination
	Water erosion
	Water table
831C2:	
Pershing	Acid soil
	Potential for ground-water contamination
	Potential for surface-water contamination
	Potential poor tilth and compaction
	Previously eroded
	Water erosion
	Water table
832B:	
Weller	Acid soil
	Potential for ground-water contamination
	Potential for surface-water contamination
	Water erosion
	Water table
832C:	
Weller	Acid soil
	Potential for ground-water contamination
	Potential for surface-water contamination
	Water erosion
	Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
832C2:	
Weller	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion Water table
832D2:	
Weller	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion Water table
880B:	
Clinton	Acid soil Potential for surface-water contamination Water erosion
880C:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Water erosion
880C2:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion
880D:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Water erosion
880D2:	
Clinton	Acid soil Limited organic matter content Potential for surface-water contamination Potential poor tilth and compaction Previously eroded Surface crusting Water erosion
977:	
Richwood	No major limitations or hazards
993D2:	
Gara	Potential for surface-water contamination Potential poor tilth and compaction Water erosion

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
993D2:	
Armstrong	Potential for ground-water contamination Potential for surface-water contamination Potential poor tilth and compaction Water erosion Water table
994D2:	
Galland	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Water erosion Water table
Douds	Acid soil Limited organic matter content Potential for surface-water contamination Previously eroded Water erosion
994E2:	
Galland	Acid soil Limited organic matter content Potential for ground-water contamination Potential for surface-water contamination Previously eroded Slope Water erosion Water table
Douds	Acid soil Limited organic matter content Potential for surface-water contamination Previously eroded Slope Water erosion
1130:	
Belinda	Acid soil Potential for ground-water contamination Restricted permeability Water table
1260:	
Beckwith	Acid soil Limited organic matter content Ponding Potential for ground-water contamination Potential for surface-water contamination Restricted permeability Water table
1715:	
Nodaway	Flooding Potential for ground-water contamination Potential for surface-water contamination
Vesser	Acid soil Flooding Potential for ground-water contamination Potential for surface-water contamination Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
1715:	
Mt. Sterling	Flooding Potential for ground-water contamination Potential for surface-water contamination Water table
1977:	
Keosauqua	No major limitations or hazards
3051:	
Vesser	Acid soil Potential for ground-water contamination Water table
3054:	
Zook	Potential for ground-water contamination Potential poor tilth and compaction Water table
3133:	
Colo	Potential for ground-water contamination Potential poor tilth and compaction Water table
3139:	
Perks	Excessive permeability Limited available water capacity Limited organic matter content Potential for ground-water contamination Wind erosion
3208:	
Klum	Limited organic matter content Potential for ground-water contamination Wind erosion
3220:	
Nodaway	Potential for ground-water contamination
3315:	
Nodaway	Potential for ground-water contamination
Klum	Limited organic matter content Potential for ground-water contamination Wind erosion
Perks	Excessive permeability Limited available water capacity Limited organic matter content Potential for ground-water contamination Wind erosion
3484:	
Lawson	Potential for ground-water contamination Water table
3520:	
Coppock	Acid soil Potential for ground-water contamination Water table

Table 6.--Cropland Management Considerations--Continued

Map symbol and soil name	Cropland management considerations
3587:	
Chequest	Acid soil Potential for ground-water contamination Potential poor tilth and compaction Water table
3720:	
Racoon	Acid soil Limited organic matter content Ponding Potential for ground-water contamination Potential for surface-water contamination Water table
5010:	
Pits, sand and gravel.	
5020:	
Pits and Dumps.	
5030:	
Pits, limestone quarries.	
5040:	
Orthents	Water erosion Wind erosion
5047:	
Aquents.	

Table 7.--Agronomic Considerations

(See text for a description of the considerations listed in this table)

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
13B----------------- Olmitz-Vesser-Zook	Very low	Very low plus	Fair.
23C2---------------- Arispe	Very low	Medium	Fair.
51------------------ Vesser	Medium	Very low plus	Fair.
51+----------------- Vesser	Low	Very low plus	Fair.
51B----------------- Vesser	Medium	Very low plus	Good.
54------------------ Zook	High	Medium	Fair.
58D2, 58E2---------- Douds	Very low	Very low plus	Fair.
58F2, 58G----------- Douds	Very low	Very low plus	Good.
65D----------------- Lindley	Medium	Low	Good.
65D2---------------- Lindley	Medium	Low	Fair.
65E----------------- Lindley	Medium	Low	Good.
65E2, 65F2---------- Lindley	Medium	Low	Fair.
65G----------------- Lindley	Medium	Low	Good.
80B, 80C------------ Clinton	High	Medium	Good.
80C2---------------- Clinton	High	Medium	Fair.
80D----------------- Clinton	High	Medium	Good.
80D2---------------- Clinton	High	Medium	Fair.
130----------------- Belinda	High	Low	Good.
131B---------------- Pershing	High	Low	Good.
131B2--------------- Pershing	High	Low	Fair.

Table 7.--Agronomic Considerations--Continued

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
131C----------------- Pershing	High	Low	Good.
131C2---------------- Pershing	High	Low	Fair.
132B, 132C----------- Weller	High	Low	Good.
132C2---------------- Weller	High	Low	Fair.
139------------------ Perks	Very low	Very low plus	Poor.
172------------------ Wabash	High	Medium	Fair.
173------------------ Hoopeston	Very low	Very low plus	Good.
179D2, 179E2--------- Gara	Medium	Low	Fair.
197------------------ Reedscreek	Very low	Very low	Fair.
208------------------ Klum	Very low	Very low plus	Good.
211------------------ Edina	Very low	Low	Fair.
220------------------ Nodaway	High	Low	Fair.
222C2---------------- Clarinda	Very low	Low	Fair.
223C2---------------- Rinda	Very low	Low	Fair.
231------------------ Edina	Very low	Low	Good.
260------------------ Beckwith	High	Very low plus	Fair.
261------------------ Appanoose	High	Low	Good.
263------------------ Okaw	Very low	Very low plus	Good.
273B, 273C----------- Olmitz	Very low	Medium	Good.
312B----------------- Seymour	Medium	Low	Good.
312B2---------------- Seymour	Medium	Low	Fair.

Table 7.--Agronomic Considerations--Continued

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
313D2, 313E2, 313F2-- Gosport	Very low	Low	Fair.
313G----------------- Gosport	Very low	Low	Good.
315------------------ Nodaway-Klum-Perks	Very low	Very low plus	Good.
362, 363------------- Haig	Medium	Medium	Fair.
364B----------------- Grundy	Low	Medium	Good.
364B2---------------- Grundy	Low	Medium	Fair.
423D2---------------- Bucknell	Very low	Very low plus	Fair.
424D2, 424E2--------- Lindley-Keswick	Very low	Low	Fair.
425D----------------- Keswick	Very low	Low	Fair.
425D2---------------- Keswick	Very low	Low	Poor.
432C2---------------- Gorin	Very low	Very low plus	Fair.
432D----------------- Gorin	Very low	Very low plus	Good.
432D2---------------- Gorin	Very low	Very low plus	Fair.
453------------------ Tuskeego	Medium	Very low plus	Fair.
460------------------ Mt. Sterling	High	Low	Fair.
520, 520B------------ Coppock	High	Medium	Fair.
531B----------------- Kniffin	High	Medium	Good.
531B2, 531C2--------- Kniffin	High	Medium	Fair.
532B, 532C----------- Rathbun	High	Medium	Good.
532C2---------------- Rathbun	High	Medium	Fair.
534------------------ Carlow	High	Medium	Fair.

Table 7.--Agronomic Considerations--Continued

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
592D2----------------Mystic	Very low	Low	Fair.
594D2----------------Galland	Very low	Very low plus	Fair.
598G-----------------Bucklick	Very low	Medium	Good.
599G-----------------Nordness-Gosport	Very low	Low	Good.
632B-----------------Adco	High	Low	Good.
699G-----------------Nordness-Bentonsport	Very low	Medium	Good.
719B-----------------Creal	Medium	Low	Good.
720------------------Racoon	Medium	Low	Good.
729------------------Nodaway-Coppock	Very low	Very low plus	Good.
730B-----------------Nodaway-Coppock-Cantril	Very low	Very low plus	Fair.
792D2----------------Armstrong	Very low	Low	Fair.
795C2----------------Ashgrove	Very low	Medium	Poor.
795D-----------------Ashgrove	Very low	Medium	Fair.
795D2----------------Ashgrove	Very low	Medium	Poor.
831B, 831C2----------Pershing	High	Low	Fair.
832B, 832C-----------Weller	High	Low	Good.
832C2, 832D2---------Weller	High	Low	Fair.
880B, 880C-----------Clinton	High	Medium	Good.
880C2----------------Clinton	High	Medium	Fair.
880D-----------------Clinton	High	Medium	Good.
880D2----------------Clinton	High	Medium	Fair.

Table 7.--Agronomic Considerations--Continued

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
977 Richwood	High	Low	Good.
993D2 Gara-Armstrong	Very low	Low	Fair.
994D2, 994E2 Galland-Douds	Very low	Very low plus	Fair.
1130 Belinda	High	Low	Good.
1260 Beckwith	High	Low	Fair.
1715 Nodaway-Vesser-Mt. Sterling	High	Low	Fair.
1977 Keosauqua	Very low	Very low plus	Good.
3051 Vesser	Medium	Very low plus	Fair.
3054 Zook	High	Medium	Fair.
3133 Colo	Very low	Very low plus	Good.
3139 Perks	Very low	Very low plus	Poor.
3208 Klum	Very low	Very low plus	Good.
3220 Nodaway	High	Low	Fair.
3315 Nodaway-Klum-Perks	Very low	Very low plus	Good.
3484 Lawson	High	Medium	Good.
3520 Coppock	High	Medium	Fair.
3587 Chequest	High	Medium	Fair.
3720 Racoon	Medium	Low	Good.
5010. Pits, sand and gravel			
5020. Pits and Dumps			

Table 7.--Agronomic Considerations--Continued

Map symbol and soil name	Subsoil phosphorus	Subsoil potassium	Tilth rating
5030. Pits, limestone quarries			
5040. Orthents			
5047. Aquents			

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
13B		60	126	63	42	49
Olmitz	2e					
Vesser	2w					
Zook	2w					
23C2:						
Arispe	3e	50	124	62	42	50
51:						
Vesser	2w	70	130	65	44	52
51+:						
Vesser	2w	75	132	66	44	53
51B:						
Vesser	2w	65	127	64	43	51
54:						
Zook	2w	70	126	63	42	50
58D:						
Douds	4e	30	79	40	26	28
58D2:						
Douds	4e	28	69	35	23	28
58E2:						
Douds	6e	18	---	---	---	---
58F2:						
Douds	7e	5	---	---	---	---
58G:						
Douds	7e	5	---	---	---	---
65D:						
Lindley	4e	40	92	46	31	40
65D2:						
Lindley	4e	38	87	43	30	39
65E:						
Lindley	6e	30	---	---	---	---
65E2:						
Lindley	6e	28	---	---	---	---
65F2:						
Lindley	7e	8	---	---	---	---
65G:						
Lindley	7e	5	---	---	---	---

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
80B:						
Clinton---------	2e	80	139	69	47	56
80C:						
Clinton---------	3e	65	134	66	45	54
80C2:						
Clinton---------	3e	60	130	65	44	52
80D:						
Clinton---------	3e	55	125	62	42	50
80D2:						
Clinton---------	3e	50	121	60	41	48
130:						
Belinda---------	3w	63	112	56	38	45
131B:						
Pershing--------	3e	67	119	60	40	48
131B2:						
Pershing--------	3e	63	112	56	38	45
131C:						
Pershing--------	3e	49	114	57	38	46
131C2:						
Pershing--------	3e	45	107	54	36	43
132B:						
Weller----------	3e	60	105	53	35	42
132C:						
Weller----------	3e	44	100	50	34	40
132C2:						
Weller----------	3e	40	93	47	31	37
139:						
Perks-----------	4s	15	55	27	17	20
139B:						
Perks-----------	6s	10	50	25	17	20
172:						
Wabash----------	3w	45	90	45	32	34
173:						
Hoopeston-------	2s	60	115	69	35	42
179D2:						
Gara------------	4e	43	106	53	36	42
179E2:						
Gara------------	6e	33	---	---	---	---
197:						
Reedscreek------	2w	25	86	43	29	34

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
208:						
Klum	2s	55	103	57	35	41
211:						
Edina	3w	55	91	46	31	37
220:						
Nodaway	2w	87	153	92	51	61
222C2:						
Clarinda	4w	25	72	36	24	29
223C2:						
Rinda	4w	22	63	32	21	25
231:						
Edina	3w	63	112	57	38	45
260:						
Beckwith	3w	57	100	50	34	40
261:						
Appanoose	3w	54	97	49	32	39
263:						
Okaw	3w	53	84	42	28	39
273B:						
Olmitz	2e	72	137	69	46	55
273C:						
Olmitz	3e	57	132	66	44	53
312B:						
Seymour	3e	60	109	55	37	44
312B2:						
Seymour	3e	55	102	51	34	41
313D2:						
Gosport	6e	10	---	---	---	---
313E2:						
Gosport	7e	5	---	---	---	---
313F2:						
Gosport	7e	5	---	---	---	---
313G:						
Gosport	7e	5	---	---	---	---
315		55	110	55	37	44
Nodaway	2w					
Klum	2s					
Perks	4s					

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
362:						
Haig------------	2w	70	131	66	44	52
363:						
Haig------------	2w	65	126	63	42	50
364B:						
Grundy----------	2e	75	133	67	45	53
364B2:						
Grundy----------	2e	70	129	65	44	51
423D2:						
Bucknell--------	4e	13	64	32	21	26
424D2------------ Lindley-Keswick	4e	15	73	37	24	29
424E2------------ Lindley-Keswick	6e	5	---	---	---	---
425D:						
Keswick---------	4e	16	65	33	22	26
425D2:						
Keswick---------	4e	12	55	28	18	22
432C2:						
Gorin-----------	3e	38	88	44	29	35
432D:						
Gorin-----------	4e	30	85	43	28	36
432D2:						
Gorin-----------	4e	26	78	39	29	32
453:						
Tuskeego--------	3w	53	105	53	36	42
460:						
Mt. Sterling----	2w	73	131	66	44	52
520:						
Coppock---------	2w	65	121	61	41	48
520B:						
Coppock---------	2w	60	118	59	40	47
531B:						
Kniffin---------	3e	54	99	50	33	40
531B2:						
Kniffin---------	3e	51	92	46	31	40
531C2:						
Kniffin---------	3e	31	87	44	29	35
532B:						
Rathbun---------	3e	49	87	44	29	44

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
532C:						
Rathbun---------	3e	32	82	41	27	33
532C2:						
Rathbun---------	3e	28	75	38	25	30
534:						
Carlow----------	3w	43	82	41	27	33
592D2:						
Mystic----------	4e	5	56	28	19	22
594D2:						
Galland---------	4e	5	54	27	18	20
598G:						
Bucklick--------	7e	5	---	---	---	---
599G-------------		5	---	---	---	---
Nordness--------	7s					
Gosport---------	7e					
632B:						
Adco------------	2e	54	99	50	33	40
699G-------------		5	---	---	---	---
Nordness--------	7s					
Bentonsport-----	7e					
719B:						
Creal-----------	2w	55	105	52	36	49
720:						
Racoon----------	2w	60	112	56	38	45
729--------------	2w	77	134	67	45	54
Nodaway-Coppock						
730B-------------		61	124	62	42	49
Nodaway---------	2w					
Coppock---------	2w					
Cantril---------	2e					
792D2:						
Armstrong-------	4e	13	62	32	21	26
795C2:						
Ashgrove--------	4e	20	54	27	18	22
795D:						
Ashgrove--------	4e	12	55	28	19	22
795D2:						
Ashgrove--------	4e	8	45	23	15	18

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
831B:						
Pershing	3e	67	119	60	40	48
831C2:						
Pershing	3e	45	107	54	36	43
832B:						
Weller	3e	60	105	53	35	42
832C:						
Weller	3e	44	100	50	34	37
832C2:						
Weller	3e	40	93	47	31	36
832D2:						
Weller	4e	28	84	42	28	34
880B:						
Clinton	2e	80	139	69	47	56
880C:						
Clinton	3e	65	132	66	44	54
880C2:						
Clinton	3e	60	130	65	44	52
880D:						
Clinton	3e	55	123	62	42	48
880D2:						
Clinton	3e	50	121	60	41	48
977:						
Richwood	1	95	162	81	55	65
993D2 Gara-Armstrong	4e	20	82	42	28	33
994D2 Galland-Douds	4e	17	60	30	20	25
994E2 Galland-Douds	6e	5	---	---	---	---
1130:						
Belinda	3w	63	112	56	38	45
1260:						
Beckwith	3w	57	100	50	34	40
1715 Nodaway-Vesser-Mt. Sterling	2w	75	131	66	44	52
1977:						
Keosauqua	1	85	146	73	49	58

See footnote at end of table.

Table 8.--Land Capability, Corn Suitability Rating, and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn suitability rating	Corn	Oats	Soybeans	Winter wheat
		PI*	Bu	Bu	Bu	Bu
3051:						
Vesser	2w	77	140	70	48	56
3054:						
Zook	2w	77	140	70	48	56
3133:						
Colo	2w	88	150	75	51	60
3139:						
Perks	4s	17	55	28	19	22
3208:						
Klum	2s	61	124	62	42	50
3220:						
Nodaway	1	95	165	82	56	66
3315		65	134	67	45	54
Nodaway	1					
Klum	2s					
Perks	4s					
3484:						
Lawson	2w	95	165	83	56	66
3520:						
Coppock	2w	72	134	67	45	54
3587:						
Chequest	2w	72	133	66	45	53
3720:						
Racoon	2w	67	125	63	42	50
5010:						
Pits, sand and gravel.						
5020:						
Pits and Dumps.						
5030:						
Pits, limestone quarries.						
5040:						
Orthents.						
5047:						
Aquents.						

* Productivity index: On a scale of 5 to 100.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
13B		6.3	3.8	5.2	3.1
Olmitz	2e				
Vesser	2w				
Zook	2w				
23C2:					
Arispe	3e	8.3	5.0	5.1	3.1
51:					
Vesser	2w	6.5	3.9	5.3	3.2
51+:					
Vesser	2w	6.7	4.0	5.4	3.2
51B:					
Vesser	2w	6.4	3.8	5.2	3.1
54:					
Zook	2w	6.4	3.8	5.2	3.1
58D:					
Douds	4e	5.1	3.1	2.9	1.8
58D2:					
Douds	4e	4.8	2.9	2.8	1.7
58E2:					
Douds	6e	3.7	2.2	2.1	1.3
58F2:					
Douds	7e	---	---	---	1.2
58G:					
Douds	7e	---	---	---	1.2
65D:					
Lindley	4e	6.9	4.2	4.1	2.5
65D2:					
Lindley	4e	6.7	4.1	4.0	2.4
65E:					
Lindley	6e	5.8	3.5	3.4	2.1
65E2:					
Lindley	6e	5.6	3.4	3.3	2.0
65F2:					
Lindley	7e	---	---	---	1.7
65G:					
Lindley	7e	---	---	---	1.7

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
80B:					
Clinton	2e	9.8	5.8	5.7	3.4
80C:					
Clinton	3e	9.4	5.6	5.5	3.3
80C2:					
Clinton	3e	9.1	5.5	5.3	3.2
80D:					
Clinton	3e	8.8	5.3	5.1	3.1
80D2:					
Clinton	3e	8.5	5.1	5.0	3.0
130:					
Belinda	3w	5.6	3.4	4.6	2.8
131B:					
Pershing	3e	8.0	4.8	4.9	2.9
131B2:					
Pershing	3e	7.5	4.5	4.6	2.8
131C:					
Pershing	3e	7.6	4.6	4.7	2.8
131C2:					
Pershing	3e	7.2	4.3	4.4	2.6
132B:					
Weller	3e	7.4	4.4	4.3	2.6
132C:					
Weller	3e	7.0	4.2	4.1	2.5
132C2:					
Weller	3e	6.5	3.9	3.8	2.3
139:					
Perks	4s	3.5	2.1	2.1	1.2
139B:					
Perks	6s	3.3	1.8	1.8	1.2
172:					
Wabash	3w	4.8	2.6	3.5	2.1
173:					
Hoopeston	2s	6.8	4.6	4.7	2.8
179D2:					
Gara	4e	7.4	4.5	4.4	2.6
179E2:					
Gara	6e	6.2	3.7	3.7	2.2
197:					
Reedscreek	2w	6.0	3.6	3.5	2.1

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
208:					
Klum	2s	7.2	4.3	4.2	2.5
211:					
Edina	3w	4.6	2.7	3.7	2.2
220:					
Nodaway	2w	10.7	6.4	6.3	3.8
222C2:					
Clarinda	4w	3.6	2.2	3.3	1.8
223C2:					
Rinda	4w	3.2	1.9	2.6	1.6
231:					
Edina	3w	5.6	3.3	4.6	2.7
260:					
Beckwith	3w	5.0	3.0	4.1	2.5
261:					
Appanoose	3w	4.9	2.9	4.0	2.4
263:					
Okaw	3w	4.9	2.9	4.0	2.4
273B:					
Olmitz	2e	9.6	5.8	5.6	3.4
273C:					
Olmitz	3e	9.3	5.5	5.4	3.3
312B:					
Seymour	3e	7.3	4.4	4.5	2.7
312B2:					
Seymour	3e	7.3	4.1	4.2	2.5
313D2:					
Gosport	6e	3.5	2.1	2.1	1.2
313E2:					
Gosport	7e	---	---	---	1.4
313F2:					
Gosport	7e	---	---	---	1.0
313G:					
Gosport	7e	---	---	---	1.0
315		7.5	4.6	4.5	2.7
Nodaway	2w				
Klum	2s				
Perks	4s				

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
362:					
Haig------------	2w	6.6	3.9	5.4	3.2
363:					
Haig------------	2w	6.4	3.8	5.2	3.0
364B:					
Grundy----------	2e	8.6	5.3	5.5	3.3
364B2:					
Grundy----------	2e	8.3	5.1	5.3	3.2
423D2:					
Bucknell--------	4e	4.3	2.6	2.6	1.6
424D2------------ Lindley-Keswick	4e	5.1	3.1	3.0	1.8
424E2------------ Lindley-Keswick	6e	3.9	2.4	2.3	1.4
425D:					
Keswick---------	4e	4.6	2.7	2.7	1.6
425D2:					
Keswick---------	4e	3.7	2.3	2.3	1.4
432C2:					
Gorin-----------	3e	6.1	3.7	3.6	2.2
432D:					
Gorin-----------	4e	5.9	3.6	3.5	2.2
432D2:					
Gorin-----------	4e	5.5	3.3	3.2	2.0
453:					
Tuskeego--------	3w	5.3	3.2	4.3	2.6
460:					
Mt. Sterling----	2w	6.7	4.0	6.3	3.8
520:					
Coppock---------	2w	6.1	3.6	5.0	3.0
520B:					
Coppock---------	2w	5.9	3.5	4.8	2.9
531B:					
Kniffin---------	3e	6.6	4.0	4.1	2.4
531B2:					
Kniffin---------	3e	6.2	3.7	3.8	2.3
531C2:					
Kniffin---------	3e	5.8	3.5	3.6	2.1
532B:					
Rathbun---------	3e	5.8	3.5	3.6	2.1

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
532C:					
Rathbun----------	3e	5.5	3.3	3.4	2.0
532C2:					
Rathbun----------	3e	5.0	3.0	3.1	1.9
534:					
Carlow-----------	3w	4.2	2.5	3.4	2.0
592D2:					
Mystic-----------	4e	3.7	2.2	2.3	1.4
594D2:					
Galland----------	4e	3.0	2.2	2.7	1.3
598G:					
Bucklick---------	7e	---	---	---	0.8
599G-------------		0.5	---	---	0.8
Nordness---------	7s				
Gosport----------	7e				
632B:					
Adco-------------	2e	6.6	4.0	4.1	2.4
699G-------------		---	---	---	0.6
Nordness---------	7s				
Bentonsport------	7e				
719B:					
Creal------------	2w	5.3	3.2	4.3	2.6
720:					
Racoon-----------	2w	5.6	3.4	4.6	2.8
729--------------	2w	9.4	5.6	5.5	3.3
Nodaway-Coppock					
730B-------------		8.3	5.0	5.2	3.1
Nodaway----------	2w				
Coppock----------	2w				
Cantril----------	2e				
792D2:					
Armstrong--------	4e	4.3	2.6	2.6	1.6
795C2:					
Ashgrove---------	4e	2.7	1.6	2.2	1.3
795D:					
Ashgrove---------	4e	2.8	1.7	2.3	1.4
795D2:					
Ashgrove---------	4e	2.3	1.4	1.9	1.1

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
831B:					
Pershing--------	3e	8.0	4.8	4.9	2.9
831C2:					
Pershing--------	3e	7.2	4.3	4.4	2.6
832B:					
Weller----------	3e	7.4	4.4	4.3	2.6
832C:					
Weller----------	3e	7.0	4.2	4.1	2.5
832C2:					
Weller----------	3e	6.5	3.9	3.8	2.3
832D2:					
Weller----------	4e	5.9	3.5	3.4	2.1
880B:					
Clinton---------	2e	9.8	5.8	5.7	3.4
880C:					
Clinton---------	3e	9.2	5.6	5.4	3.2
880C2:					
Clinton---------	3e	9.0	5.5	5.3	3.2
880D:					
Clinton---------	3e	8.7	5.2	5.1	3.1
880D2:					
Clinton---------	3e	8.4	5.1	5.0	3.0
977:					
Richwood--------	1	11.2	6.8	6.6	4.0
993D2------------ Gara-Armstrong	4e	5.5	3.3	3.4	2.0
994D2------------ Galland-Douds	4e	3.8	2.3	2.4	1.4
994E2------------ Galland-Douds	6e	2.7	1.6	1.7	1.0
1130:					
Belinda---------	3w	5.6	3.4	4.6	2.8
1260:					
Beckwith--------	3w	5.0	3.0	4.1	2.5
1715------------- Nodaway-Vesser-Mt. Sterling	2w	9.1	5.6	5.5	3.3
1977:					
Keosauqua-------	1	10.2	6.1	6.0	3.6

See footnote at end of table.

Table 9.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Bromegrass-alfalfa	Bromegrass-alfalfa hay	Smooth bromegrass	Kentucky bluegrass
		AUM*	Tons	AUM*	AUM*
3051:					
Vesser----------	2w	6.9	4.2	5.7	3.4
3054:					
Zook------------	2w	6.9	4.2	5.8	3.4
3133:					
Colo------------	2w	7.4	4.5	6.2	3.6
3139:					
Perks-----------	4s	3.8	2.3	2.3	1.3
3208:					
Klum------------	2s	8.6	5.2	5.1	3.0
3220:					
Nodaway---------	1	11.3	6.9	6.8	4.1
3315-------------		9.1	5.6	5.5	3.3
Nodaway---------	1				
Klum------------	2s				
Perks-----------	4s				
3484:					
Lawson----------	3w	---	6.6	6.7	4.1
3520:					
Coppock---------	2w	6.1	3.9	5.5	3.3
3587:					
Chequest--------	2w	6.0	3.9	5.4	3.3
3720:					
Racoon----------	2w	5.8	3.8	5.1	3.1
5010:					
Pits, sand and gravel.					
5020:					
Pits and Dumps.					
5030:					
Pits, limestone quarries.					
5040:					
Orthents.					
5047:					
Aquents.					

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

Table 10.--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 map unit name)

Map symbol	Soil name
13B	Olmitz-Vesser-Zook complex, 0 to 5 percent slopes (where drained)
51	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
51+	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, overwash (where drained)
51B	Vesser silt loam, 2 to 5 percent slopes, rarely flooded
54	Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded (where drained)
80B	Clinton silt loam, 2 to 5 percent slopes
131B	Pershing silt loam, 2 to 5 percent slopes
131B2	Pershing silty clay loam, 2 to 5 percent slopes, moderately eroded
132B	Weller silt loam, 2 to 5 percent slopes
208	Klum fine sandy loam, 0 to 2 percent slopes, occasionally flooded
220	Nodaway silt loam, 0 to 2 percent slopes, occasionally flooded
273B	Olmitz loam, 2 to 5 percent slopes
364B	Grundy silt loam, 2 to 5 percent slopes
364B2	Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded
453	Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded (where drained)
460	Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
520	Coppock silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
520B	Coppock silt loam, 2 to 5 percent slopes, rarely flooded
719B	Creal silt loam, 2 to 5 percent slopes, rarely flooded
720	Racoon silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
729	Nodaway-Coppock complex, 0 to 2 percent slopes, occasionally flooded (where drained)
730B	Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes
831B	Pershing silt loam, bench, 2 to 5 percent slopes
832B	Weller silt loam, bench, 2 to 5 percent slopes
880B	Clinton silt loam, bench, 2 to 5 percent slopes
977	Richwood silt loam, 0 to 2 percent slopes
1715	Nodaway-Vesser-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded (where drained)
1977	Keosauqua loam, 1 to 3 percent slopes
3051	Vesser silt loam, 0 to 2 percent slopes, rarely flooded (where drained)
3054	Zook silty clay loam, 0 to 2 percent slopes, rarely flooded (where drained)
3133	Colo silty clay loam, 0 to 2 percent slopes, rarely flooded (where drained)
3208	Klum fine sandy loam, 0 to 2 percent slopes, rarely flooded
3220	Nodaway silt loam, 0 to 2 percent slopes, rarely flooded
3484	Lawson silt loam, 0 to 2 percent slopes, rarely flooded
3520	Coppock silt loam, 0 to 2 percent slopes, rarely flooded (where drained)
3587	Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded (where drained)
3720	Racoon silt loam, 0 to 2 percent slopes, rarely flooded (where drained)

Table 11.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
13B:					
Olmitz	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Zook	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
23C2:					
Arispe	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
51:					
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
51+:					
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
51B:					
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 11.--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
54:					
Zook	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
58D:					
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
58D2:					
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
58E2:					
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
58F2:					
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
58G:					
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
65D:					
Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
65D2:					
Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
65E:					
Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.

Table 11.--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
65E2: Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
65F2: Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
65G: Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
80B: Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
80C: Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
80C2: Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
80D: Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
80D2: Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
130: Belinda	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 11.--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
131B:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
131B2:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
131C:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
131C2:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
132B:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
132C:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
132C2:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
139:					
Perks	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
139B:					
Perks	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
172:					
Wabash	Buttonbush	Possumhaw	Hackberry, eastern redcedar, northern whitecedar, nannyberry viburnum.	Pin oak, baldcypress.	Eastern cottonwood.
173:					
Hoopeston	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
179D2:					
Gara	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
179E2:					
Gara	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

Table 11.--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
197:					
Reedscreek	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
208:					
Klum	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
211:					
Edina.					
220:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
222C2:					
Clarinda	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange.	Austrian pine, eastern white pine, pin oak.	---
223C2:					
Rinda	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
231:					
Edina	Redosier dogwood	Silky dogwood, holly, American cranberrybush.	Washington hawthorn, green ash, Austrian pine, northern whitecedar.	Red maple, eastern white pine.	Pin oak.

Table 11.--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
260:					
Beckwith	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
261:					
Appanoose	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
263:					
Okaw	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
273B:					
Olmitz	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
273C:					
Olmitz	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
312B:					
Seymour	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
312B2:					
Seymour	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
313D2:					
Gosport	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
313E2:					
Gosport	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
313F2:					
Gosport	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
313G:					
Gosport	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
315:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Klum	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Perks	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

Table 11.--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
362:					
Haig	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
363:					
Haig	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
364B:					
Grundy	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
364B2:					
Grundy	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
423D2:					
Bucknell	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
424D2:					
Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
Keswick	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
424E2:					
Lindley	Redosier dogwood, fragrant sumac.	Silky dogwood, American plum, arrowwood.	Washington hawthorn.	White fir, green ash, Douglas-fir, pin oak, northern red oak.	Eastern white pine.
Keswick	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
425D:					
Keswick	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
425D2:					
Keswick	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
432C2:					
Gorin	Fragrant sumac	Amur maple, gray dogwood, possumhaw, ninebark.	Hackberry, eastern redcedar, Norway spruce.	Honeylocust, Austrian pine, pin oak.	---
432D:					
Gorin	Fragrant sumac	Amur maple, gray dogwood, possumhaw, ninebark.	Hackberry, eastern redcedar, Norway spruce.	Honeylocust, Austrian pine, pin oak.	---
432D2:					
Gorin	Fragrant sumac	Amur maple, gray dogwood, possumhaw, ninebark.	Hackberry, eastern redcedar, Norway spruce.	Honeylocust, Austrian pine, pin oak.	---
453:					
Tuskeego	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 11.--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
460:					
Mt. Sterling	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
520:					
Coppock	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
520B:					
Coppock	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
531B:					
Kniffin	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
531B2:					
Kniffin	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
531C2:					
Kniffin	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
532B:					
Rathbun	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
532C:					
Rathbun	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
532C2:					
Rathbun	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
534:					
Carlow	Buttonbush	Possumhaw	Hackberry, eastern redcedar, northern whitecedar, nannyberry viburnum.	Pin oak, baldcypress.	Eastern cottonwood.
592D2:					
Mystic	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
594D2:					
Galland	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
598G:					
Bucklick	Fragrant sumac	Gray dogwood, American plum, arrowwood.	Eastern redbud, Washington hawthorn, eastern redcedar.	White fir, green ash, yellow-poplar, northern red oak.	Eastern white pine.

Table 11.--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
599G:					
Nordness.					
Gosport	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
632B:					
Adco	Fragrant sumac	Amur maple, gray dogwood, possumhaw, ninebark.	Hackberry, eastern redcedar, Norway spruce.	Honeylocust, Austrian pine, pin oak.	---
699G:					
Nordness.					
Bentonsport	White fir, silky dogwood, Washington hawthorn, Amur privet, Amur honeysuckle, Norway spruce, blue spruce, eastern white pine, pin oak, northern whitecedar.	---	---	---	---
719B:					
Creal	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
720:					
Racoon	Redosier dogwood	American plum, common chokecherry.	Hackberry, eastern redcedar.	Silver maple, green ash, honeylocust, Norway spruce, northern red oak, golden willow.	Eastern cottonwood.
729:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

Table 11.--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
729:					
Coppock	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
730B:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Coppock	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Cantril	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
792D2:					
Armstrong	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
795C2:					
Ashgrove	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
795D:					
Ashgrove	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
795D2:					
Ashgrove	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
831B:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
831C2:					
Pershing	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
832B:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
832C:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
832C2:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---

Table 11.--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
832D2:					
Weller	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
880B:					
Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
880C:					
Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
880C2:					
Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
880D:					
Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
880D2:					
Clinton	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
977:					
Richwood	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
993D2:					
Gara	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

Table 11.--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
993D2:					
Armstrong	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
994D2:					
Galland	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
994E2:					
Galland	---	Washington hawthorn, eastern redcedar, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Douds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
1130:					
Belinda	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
1260:					
Beckwith	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 11.--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
1715:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
Mt. Sterling	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
1977:					
Keosauqua	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, blue spruce, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
3051:					
Vesser	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
3054:					
Zook	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
3133:					
Colo	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.

Table 11.--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
3139:					
Perks	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
3208:					
Klum	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
3220:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
3315:					
Nodaway	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Klum	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
Perks	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
3484:					
Lawson	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.

Table 11.--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
3520:					
Coppock	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Austrian pine, blue spruce, northern whitecedar.	Norway spruce	Eastern white pine, pin oak.
3587:					
Chequest	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	White fir, Washington hawthorn, Norway spruce, Austrian pine, blue spruce, northern whitecedar.	Eastern white pine	Pin oak.
3720:					
Racoon	Redosier dogwood	American plum, common chokecherry.	Hackberry, eastern redcedar.	Silver maple, green ash, honeylocust, Norway spruce, northern red oak, golden willow.	Eastern cottonwood.
5010:					
Pits, sand and gravel.					
5020:					
Pits and Dumps.					
5030:					
Pits, limestone quarries.					
5040:					
Orthents.					
5047:					
Aquents.					

Table 12.--Windbreak Suitability Groups

(See text for a description of the characteristics of the soils in each group. Absence of an entry indicates that a windbreak suitability group is not assigned. Suitable shrubs and trees with their mature heights are listed in table 11)

Map symbol and soil name	Windbreak suitability group
13B:	
Olmitz	3
Vesser	1
Zook	2
23C2 Arispe	4
51, 51+ Vesser	2
51B Vesser	1
54 Zook	2
58D, 58D2, 58E2, 58F2, 58G Douds	3
65D, 65D2, 65E, 65E2, 65F2, 65G Lindley	3
80B, 80C, 80C2, 80D, 80D2 Clinton	3
130 Belinda	2
131B, 131B2, 131C, 131C2 Pershing	4
132B, 132C, 132C2 Weller	4
139, 139B Perks	7
172 Wabash	2
173 Hoopeston	1
179D2, 179E2 Gara	3

Table 12.--Windbreak Suitability Groups--Continued

Map symbol and soil name	Windbreak suitability group
197------------ Reedscreek	1K
208------------ Klum	1
211------------ Edina	10
220------------ Nodaway	1
222C2---------- Clarinda	2
223C2---------- Rinda	2
231------------ Edina	2
260------------ Beckwith	2
261------------ Appanoose	2
263------------ Okaw	2
273B, 273C----- Olmitz	3
312B, 312B2---- Seymour	4
313D2, 313E2, 313F2, 313G--- Gosport	4
315:	
Nodaway-------	1
Klum----------	1
Perks---------	7
362, 363------- Haig	2
364B, 364B2---- Grundy	4
423D2---------- Bucknell	4
424D2, 424E2:	
Lindley-------	3
Keswick-------	4
425D, 425D2---- Keswick	4

Table 12.--Windbreak Suitability Groups--Continued

Map symbol and soil name	Windbreak suitability group
432C2, 432D, 432D2 Gorin	4
453 Tuskeego	2
460 Mt. Sterling	2
520 Coppock	2
520B Coppock	1
531B, 531B2, 531C2 Kniffin	4
532B, 532C, 532C2 Rathbun	4
534 Carlow	2
592D2 Mystic	4
594D2 Galland	4
599G:	
Nordness	10
Gosport	4
632B Adco	4
699G:	
Nordness	10
Bentonsport	8
719B Creal	1
720 Racoon	2
729:	
Nodaway	1
Coppock	2
730B:	
Nodaway	1
Coppock	1
Cantril	1

Table 12.--Windbreak Suitability Groups--Continued

Map symbol and soil name	Windbreak suitability group
792D2 Armstrong	4
795C2, 795D, 795D2 Ashgrove	4
831B, 831C2 Pershing	4
832B, 832C, 832C2, 832D2 Weller	4
880B, 880C, 880C2, 880D, 880D2 Clinton	3
977 Richwood	3
993D2:	
Gara	3
Armstrong	4
994D2, 994E2:	
Galland	4
Douds	3
1130 Belinda	2
1260 Beckwith	2
1715:	
Nodaway	1
Vesser	2
Mt. Sterling	2
1977 Keosauqua	3
3051 Vesser	2
3054 Zook	2
3133 Colo	2
3139 Perks	1
3208 Klum	1

Table 12.--Windbreak Suitability Groups--Continued

Map symbol and soil name	Windbreak suitability group
3220 Nodaway	1
3315:	
Nodaway	1
Klum	1
Perks	1
3484 Lawson	1
3520 Coppock	2
3587 Chequest	2
3720 Racoon	2
5010. Pits, sand and gravel	
5020. Pits and Dumps	
5030. Pits, limestone quarries	
5040. Orthents	
5047. Aquents	

Forest Land

The original land survey of Iowa, made between 1832 and 1859, indicated that more than half of Van Buren County, or about 157,845 acres, was wooded when the first settlers arrived. The early settlers felled most of the trees as they cleared the land for crops and pasture (Andreas, 1875).

A 1954 survey conducted by the USDA Forest Service indicated that 20 percent of the county, or 61,900 acres, was timbered (Davidson, 1961). Between 1954 and 1974, 42 percent of this timbered acreage had been cleared. By 1974, Forest Service records indicate that about 12 percent of the county, or 36,000 acres, was wooded. This decrease in woodland acres has been attributed to the conversion of moderately steep and highly erodible woodland sites to pasture and cropland (Ostron, 1974).

The trend toward a continuously shrinking forest resource was reversed between 1974 and 1991. A 1991 Forest Service survey indicated that 18 percent of the survey area, or 55,800 acres, was wooded. This dramatic increase in forested acres occurred when lands formerly classified as improved pasture, improved pasture with trees, or woodland pasture were reclassified as woodland. This reclassification occurred because livestock was removed from these areas. Unfortunately, the removal of livestock was prompted by declining cattle markets rather than by a sincere interest in woodland stewardship (Branel and Walkowiak, 1991).

Soil Characteristics and Tree Growth

The majority of upland timber in Van Buren County is in areas of Lindley, Gosport, Weller, Keswick, Gara, and Rathbun soils. The majority of bottom-land timber is in areas of Nodaway, Coppock, and Douds soils and on terrace escarpments.

The principal upland tree species are white oak, red oak, black oak, post oak, shagbark hickory, and bitternut hickory. The principal bottom-land species are eastern cottonwood, silver maple, green ash, hackberry, pin oak, swamp white oak, basswood, and black walnut. Other species that grow in the county, although they are not abundant, are black cherry, river birch, sycamore, and hard maple. American elm and red elm are common in upland and bottom-land stands; however, individual trees are typically small as a result of mortality caused by Dutch elm disease. Abandoned pastures typically become quickly occupied by redcedar, honeylocust, Osage-orange, and shingle oak.

The suitability of soil types for growing individual tree species varies greatly. As a rule, trees grow best in areas of deep, well drained or moderately well drained soils. If the soil is slowly permeable, root development and tree growth are severely restricted (Countryman and others, 1985). Soils on north- and east-facing slopes are cooler and damper than those on south- and west-facing slopes and are well suited to red oak, black oak, and hard maple. Soils on ridgetops and on south- and west-facing slopes are warmer and drier and are well suited to white oak, post oak, and hickory. Most well drained soils on bottom land are excellent sites for black walnut. Cottonwood and silver maple can grow well on somewhat poorly drained bottom-land soils. Green ash generally grows best in areas of soils on bottom land but can also grow well on some upland sites. Severely eroded soils that formed under woodland vegetation are suitable sites for eastern redcedar, Scotch pine, white pine, jack pine, black locust, and Osage-orange.

Tree Planting

If hardwood tree species are to be planted, suitable soils include those that formed under woodland vegetation or prairie vegetation or that have been used for row crops.

Beginning in 1985, tree planting has become an important component of Van Buren County's conservation efforts. Tree plantings of between 10 and 40 acres on highly erodible land enrolled in the Conservation Reserve Program have become common. Several tree planting projects in the county have involved more than 100 acres.

More than 90 percent of the trees planted in Van Buren County between 1985 and 1996 are hardwood species, such as white oak, red oak, bur oak, swamp white oak, black walnut, green ash, white ash, silver maple, hard maple, Chinese chestnut, and cottonwood. The remaining planted seedlings have been softwoods, such as white pine, red pine, Scotch pine, Norway spruce, white spruce, and redcedar.

Trends in tree planting in Van Buren County have shifted dramatically over the last 40 years. In the late 1950's and early 1960's, pine species were heavily promoted and planted. Softwood species were promoted because it was believed that they would be more valuable in the future than native hardwoods. It was also believed, because of poor growth rates and poor survivability, that native hardwood species were not well suited for planting on cultivated and moderately eroded soils. Both of these beliefs have been proven to be erroneous.

Demand and prices for native hardwood lumber, such as white oak, red oak, black oak, silver maple, green ash, and black walnut, have never been stronger. In contrast, demand for Iowa-grown pine timber is weak or nonexistent. The successful hardwood plantations of recent decades have proven that the problem of growing native hardwoods on cultivated soils has primarily been a function of poor planning, poor implementation, and poor follow-up. With proper site preparation, planting technique, species selection, and control of grass and weed competition, native hardwood plantings can be extremely successful.

Forest Land Management

Forest land owners have a tendency to cut only the best individual trees or species from their woodlots. This practice, known as high-grading, results in a residual stand of poor-quality trees. Scientific forest management of woodland stands, known as silviculture, can result in production of an increased volume of valuable forest products. A well managed timber stand can maximize economic return, reduce the hazard of erosion, improve water quality, provide wildlife habitat, and enhance recreational opportunities.

Woodlands can produce an array of benefits if proper management is applied. The first step in sound forest management is protecting forest land from grazing. Grazing by livestock results in sparse, poor-quality stands. Livestock hooves damage the base of trees. This damage allows decay organisms to enter the tree's main stem. The resultant decay reduces the value of the standing trees. Livestock browse and trample young seedlings. They also cause soil compaction, which reduces the rate of water infiltration and thus reduces the supply of moisture needed for rapid tree growth. Soil compaction also increases the runoff rate, which can result in erosion and in the siltation of streams (Wray and Farris, 1986).

Other important forest management activities can include timber stand improvement (TSI) and timber harvesting. TSI activities include crop-tree release management and weed-tree eradication.

Crop-tree release involves selecting 40 to 50 of the best individual trees in the woodlot and thinning around the selected crop trees. Releasing crop trees increases the amount of sunlight the trees receive. Increased sunlight allows trees to expand their live crowns and thus promotes faster diameter growth and shortened rotation age. Weed-tree eradication involves eliminating all undesirable species down to 1 inch in diameter from the stand. This process is used to prepare the site for tree planting or to stimulate natural regeneration of desired species. Weed-tree eradication is common in preparation for a timber harvest.

Harvesting of forest land should be undertaken only after plans have been made for regeneration of the timber stand. Regeneration can be accomplished by manipulating the stand so that the growth of naturally regenerated tree seedlings is encouraged or by a combination of stand manipulation and artificial regeneration (planting).

Each woodland or tree planting site presents its own unique set of problems and possible solutions. Professional forestry advice is available from the district foresters of the Iowa Department of Natural Resources, from Resource Conservation and Development (RC&D) foresters, or from private consulting foresters.

The information in table 13 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the ***ordination symbol***, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter ***R*** indicates steep slopes; ***X***, stoniness or rockiness; ***W***, excess water in or on the soil; ***T***, toxic substances in the soil; ***D***, restricted rooting depth; ***C***, clay in the upper part of the soil; ***S***, sandy texture; ***F***, a high content of rock fragments in the soil; and ***N***, snowpack. The letter ***A*** indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In the table, ***slight, moderate,*** and ***severe*** indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of ***slight*** indicates that no particular prevention measures are needed under ordinary conditions. A rating of ***moderate*** indicates that erosion-control measures are needed in certain silvicultural activities. A rating of ***severe*** indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of ***slight*** indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of ***moderate*** indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of ***severe*** indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of ***slight*** indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of ***moderate*** indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of ***severe*** indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of ***slight*** indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of ***moderate*** indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of ***severe*** indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are the depth to the water table and the available water capacity. A rating of ***slight*** indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of ***moderate*** indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of ***severe*** indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The ***potential productivity*** of merchantable or ***common trees*** on a soil is expressed as a site index and as a volume number. The ***site index*** is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The ***volume of wood fiber***, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of wood fiber produced in a fully stocked, even-aged stand.

Suggested trees to plant are those that are suitable for commercial wood production.

Table 13.--Forest Land Management and Productivity

(Only the soils suitable for production of commercial trees are listed)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber*	Suggested trees to plant
58D:										
Douds	3A	Slight	Slight	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
58D2:										
Douds	3A	Slight	Slight	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
58E2:										
Douds	3R	Moderate	Moderate	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
58F2:										
Douds	3R	Moderate	Moderate	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
58G:										
Douds	3R	Moderate	Moderate	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
65D:										
Lindley	3A	Slight	Slight	Slight	Slight	Severe	White oak	56	3	White oak, northern red oak, black oak.
							Northern red oak	61	3	
							Black oak	63	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
65D2:										
Lindley-------	3A	Slight	Slight	Slight	Slight	Severe	White oak-----------	56	3	White oak, northern red oak, black oak.
							Northern red oak----	61	3	
							Black oak-----------	63	3	
65E:										
Lindley-------	3R	Moderate	Moderate	Slight	Slight	Severe	White oak-----------	56	3	White oak, northern red oak, black oak.
							Northern red oak----	61	3	
							Black oak-----------	63	3	
65E2:										
Lindley-------	3R	Moderate	Moderate	Slight	Slight	Severe	White oak-----------	56	3	White oak, northern red oak, black oak.
							Northern red oak----	61	3	
							Black oak-----------	63	3	
65F2:										
Lindley-------	3R	Moderate	Moderate	Slight	Slight	Severe	White oak-----------	56	3	White oak, northern red oak, black oak.
							Northern red oak----	61	3	
							Black oak-----------	63	3	
65G:										
Lindley-------	3R	Moderate	Moderate	Slight	Slight	Severe	White oak-----------	56	3	White oak, northern red oak, black oak.
							Northern red oak----	61	3	
							Black oak-----------	63	3	
80B:										
Clinton-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak----	65	3	
80C:										
Clinton-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak----	65	3	
80C2:										
Clinton-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak----	65	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
80D:										
Clinton-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak----	65	3	
80D2:										
Clinton-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak----	65	3	
130:										
Belinda-------	2W	Slight	Severe	Moderate	Moderate	Severe	White oak-----------	45	2	Silver maple, green ash, American sycamore, eastern cottonwood, golden willow, northern whitecedar.
131B:										
Pershing------	3C	Slight	Slight	Severe	Severe	Slight	White oak-----------	55	3	Red pine, eastern white pine, white oak.
131B2:										
Pershing------	3C	Slight	Slight	Severe	Severe	Slight	White oak-----------	55	3	Red pine, eastern white pine, white oak.
131C:										
Pershing------	3C	Slight	Slight	Severe	Severe	Slight	White oak-----------	55	3	Red pine, eastern white pine, white oak.
131C2:										
Pershing------	3C	Slight	Slight	Severe	Severe	Slight	White oak-----------	55	3	Red pine, eastern white pine, white oak.

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber*	Suggested trees to plant
132B:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
132C:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
132C2:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
139:										
Perks	3S	Slight	Slight	Moderate	Slight	Slight	White oak	55	3	Eastern white pine.
139B:										
Perks	3S	Slight	Slight	Moderate	Slight	Slight	White oak	55	3	Eastern white pine.
172:										
Wabash	4W	Slight	Severe	Severe	Moderate	Severe	Pin oak	75	4	Pecan, eastern cottonwood, pin oak.
179D2:										
Gara	3A	Slight	Slight	Slight	Slight	Slight	White oak Northern red oak	55 55	3 3	Red pine, eastern white pine, white oak, northern red oak.
179E2:										
Gara	3R	Moderate	Moderate	Slight	Slight	Slight	White oak Northern red oak	55 55	3 3	Red pine, eastern white pine, white oak, northern red oak.
220:										
Nodaway	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
223C2:										
Rinda	2W	Slight	Severe	Moderate	Moderate	Severe	White oak	45	2	Silver maple, hackberry, green ash, eastern redcedar, Norway spruce, white spruce, American sycamore.
							Northern red oak	45	2	
260:										
Beckwith	2W	Slight	Severe	Moderate	Moderate	Severe	White oak	45	2	Silver maple, green ash, American sycamore, eastern cottonwood.
261:										
Appanoose	2W	Slight	Moderate	Moderate	Moderate	Severe	White oak	45	2	Silver maple, green ash, American sycamore, eastern cottonwood, laurel willow, northern whitecedar.
263:										
Okaw	4W	Slight	Severe	Severe	Severe	Severe	White oak	---	---	Red maple, green ash, water tupelo, swamp white oak, pin oak, baldcypress.
							Blackjack oak	60	3	
							Black oak	55	3	
							Pin oak	70	4	
313D2:										
Gosport	2C	Slight	Slight	Severe	Severe	Slight	White oak	45	2	Norway spruce, white spruce, red pine, eastern white pine, Scotch pine, cottonwood.
313E2:										
Gosport	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	Norway spruce, white spruce, red pine, eastern white pine, Scotch pine, cottonwood.

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber*	Suggested trees to plant
313F2:										
Gosport	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	Norway spruce, white spruce, red pine, eastern white pine, Scotch pine, cottonwood.
313G:										
Gosport	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	Norway spruce, white spruce, red pine, eastern white pine, Scotch pine, cottonwood.
315:										
Nodaway	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.
Klum.										
Perks	3S	Slight	Slight	Moderate	Slight	Slight	White oak	55	3	Eastern white pine.
423D2:										
Bucknell	2C	Slight	Slight	Slight	Moderate	Slight	White oak	50	2	Silver maple, hackberry, green ash, eastern redcedar, American sycamore.
							Northern red oak	50	2	
424D2:										
Lindley	3A	Slight	Slight	Slight	Slight	Severe	White oak	56	3	White oak, northern red oak, black oak.
							Northern red oak	61	3	
							Black oak	63	3	
Keswick	3C	Slight	Slight	Moderate	Severe	Slight	White oak	55	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	55	3	
424E2:										
Lindley	3R	Moderate	Moderate	Slight	Slight	Severe	White oak	56	3	White oak, northern red oak, black oak.
							Northern red oak	61	3	
							Black oak	63	3	
Keswick	3R	Moderate	Moderate	Moderate	Severe	Slight	White oak	55	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	55	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
425D:										
Keswick	3C	Slight	Slight	Moderate	Severe	Slight	White oak	55	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	55	3	
425D2:										
Keswick	3C	Slight	Slight	Moderate	Severe	Slight	White oak	55	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	55	3	
432C2:										
Gorin	3C	Slight	Slight	Moderate	Severe	Severe	White oak	53	3	White oak, northern red oak, black oak.
							Northern red oak	62	3	
							Black oak	61	3	
432D:										
Gorin	3C	Slight	Slight	Moderate	Severe	Severe	White oak	53	3	White oak, northern red oak, black oak.
							Northern red oak	62	3	
							Black oak	61	3	
432D2:										
Gorin	3C	Slight	Slight	Moderate	Severe	Severe	White oak	53	3	White oak, northern red oak, black oak.
							Northern red oak	62	3	
							Black oak	61	3	
453:										
Tuskeego	2W	Slight	Severe	Moderate	Moderate	Severe	Silver maple	80	2	Silver maple, green ash, American sycamore, eastern cottonwood, laurel willow, northern whitecedar.
							Eastern cottonwood	90	7	
460:										
Mt. Sterling	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, black walnut, red pine, eastern white pine, cottonwood.
520:										
Coppock	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	65	3	
520B:										
Coppock	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	65	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
531B:										
Kniffin-------	3C	Slight	Moderate	Moderate	Slight	Moderate	White oak-----------	55	3	Sugar maple, black walnut, red pine, eastern white pine.
531B2:										
Kniffin-------	3C	Slight	Moderate	Moderate	Slight	Moderate	White oak-----------	55	3	Sugar maple, black walnut, red pine, eastern white pine.
531C2:										
Kniffin-------	3C	Slight	Moderate	Moderate	Slight	Moderate	White oak-----------	55	3	Sugar maple, black walnut, red pine, eastern white pine.
532B:										
Rathbun-------	3C	Slight	Slight	Moderate	Moderate	Slight	White oak-----------	55	3	Black walnut, red pine, eastern white pine.
532C:										
Rathbun-------	3C	Slight	Slight	Moderate	Moderate	Slight	White oak-----------	55	3	Black walnut, red pine, eastern white pine.
532C2:										
Rathbun-------	3C	Slight	Slight	Moderate	Moderate	Slight	White oak-----------	55	3	Black walnut, red pine, eastern white pine.
534:										
Carlow--------	4W	Slight	Severe	Severe	Moderate	Severe	Eastern cottonwood--	85	6	Silver maple, pecan, green ash, sweetgum, eastern cottonwood, pin oak, willow oak, baldcypress.
							Pin oak-------------	75	4	
592D2:										
Mystic--------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	55	3	Sugar maple, black walnut, red pine, eastern white pine.

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
594D2:										
Galland	3C	Slight	Slight	Severe	Severe	Moderate	White oak	65	3	Sugar maple, black walnut, red pine, eastern white pine.
							Northern red oak	70	4	
598G:										
Bucklick	3R	Moderate	Moderate	Slight	Slight	Moderate	Sugar maple	---	---	Green ash, yellow-poplar, eastern white pine, white oak.
							Northern red oak	---	---	
							Post oak	---	---	
							Black oak	---	---	
							White oak	61	3	
599G:										
Nordness	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	---
							Northern red oak	45	2	
Gosport	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	Norway spruce, white spruce, red pine, eastern white pine, Scotch pine, cottonwood.
699G:										
Nordness	2R	Moderate	Moderate	Severe	Severe	Slight	White oak	45	2	---
							Northern red oak	45	2	
Bentonsport	3R	Severe	Severe	Slight	Slight	Slight	Northern red oak	55	3	Sugar maple, red pine, eastern white pine, Scotch pine, white oak, northern red oak.
719B:										
Creal	4A	Slight	Slight	Slight	Slight	Slight	Bur oak	---	---	Pecan, white ash, green ash, yellow-poplar, eastern white pine, white oak, northern red oak.
							Green ash	---	---	
							White oak	70	4	
							Northern red oak	70	4	
720:										
Racoon	4W	Slight	Severe	Moderate	Severe	Severe	Green ash	---	---	Red maple, water tupelo, pin oak, baldcypress.
							White oak	---	---	
							Post oak	80	4	
							Pin oak	80	4	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
729:										
Nodaway-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.
Coppock-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Sugar maple, red pine, eastern white pine.
							Northern red oak----	65	3	
730B:										
Nodaway-------	3A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.
Coppock.										
Cantril-------	4A	Slight	Slight	Slight	Slight	Moderate	White oak-----------	75	4	Sugar maple, white spruce, red pine, eastern white pine.
792D2:										
Armstrong-----	3C	Slight	Slight	Moderate	Severe	Slight	White oak-----------	55	3	Sugar maple, European larch, red pine, eastern white pine.
							Northern red oak----	55	3	
795C2:										
Ashgrove------	2W	Slight	Severe	Moderate	Moderate	Severe	White oak-----------	45	2	Silver maple, hackberry, green ash, American sycamore.
							Northern red oak----	45	2	
795D:										
Ashgrove------	2W	Slight	Severe	Moderate	Moderate	Severe	White oak-----------	45	2	Silver maple, hackberry, green ash, American sycamore.
							Northern red oak----	45	2	
795D2:										
Ashgrove------	2W	Slight	Severe	Moderate	Moderate	Severe	White oak-----------	45	2	Silver maple, hackberry, green ash, American sycamore.
							Northern red oak----	45	2	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber*	Suggested trees to plant
831B:										
Pershing	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Red pine, eastern white pine, white oak.
831C2:										
Pershing	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Red pine, eastern white pine, white oak.
832B:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
832C:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
832C2:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
832D2:										
Weller	3C	Slight	Slight	Severe	Severe	Slight	White oak	55	3	Sugar maple, black walnut, red pine, eastern white pine.
880B:										
Clinton	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	65	3	
880C:										
Clinton	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	65	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber*	Suggested trees to plant
880C2:										
Clinton	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	65	3	
880D:										
Clinton	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	65	3	
880D2:										
Clinton	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Black walnut, European larch, red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	65	3	
993D2:										
Gara	3A	Slight	Slight	Slight	Slight	Slight	White oak	55	3	Red pine, eastern white pine, white oak, northern red oak.
							Northern red oak	55	3	
Armstrong	3C	Slight	Slight	Moderate	Severe	Slight	White oak	55	3	Sugar maple, European larch, red pine, eastern white pine.
							Northern red oak	55	3	
994D2:										
Galland	3C	Slight	Slight	Severe	Severe	Moderate	White oak	65	3	Sugar maple, black walnut, red pine, eastern white pine.
							Northern red oak	70	4	
Douds	3A	Slight	Slight	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
994E2:										
Galland	3R	Moderate	Moderate	Severe	Severe	Moderate	White oak	65	3	Sugar maple, black walnut, red pine, eastern white pine.
							Northern red oak	70	4	
Douds	3R	Moderate	Moderate	Slight	Slight	Slight	White oak	55	3	Sugar maple, European larch, Norway spruce, white spruce, red pine, eastern white pine, Scotch pine.
							Northern red oak	55	3	
1130:										
Belinda	2W	Slight	Severe	Moderate	Moderate	Severe	White oak	45	2	Silver maple, green ash, American sycamore, eastern cottonwood, golden willow, northern whitecedar.
1260:										
Beckwith	2W	Slight	Severe	Moderate	Moderate	Severe	White oak	45	2	Silver maple, green ash, American sycamore, eastern cottonwood.
3139:										
Perks	3S	Slight	Slight	Moderate	Slight	Slight	White oak	55	3	Eastern white pine.
3220:										
Nodaway	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.
3315:										
Nodaway	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, black walnut, European larch, red pine, eastern white pine.
Klum.										
Perks	3S	Slight	Slight	Moderate	Slight	Slight	White oak	55	3	Eastern white pine.

See footnote at end of table.

Table 13.--Forest Land Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber*	Suggested trees to plant
3484:										
Lawson	2A	Slight	Slight	Slight	Slight	Severe	Red maple	---	---	Silver maple, white ash, white spruce.
							Silver maple	70	2	
							White ash	---	---	
3520:										
Coppock	3A	Slight	Slight	Slight	Slight	Moderate	White oak	65	3	Sugar maple, red pine, eastern white pine.
							Northern red oak	65	3	
3587:										
Chequest	2W	Slight	Severe	Moderate	Moderate	Severe	Silver maple	80	2	Silver maple, green ash, American sycamore, eastern cottonwood, laurel willow, northern whitecedar.
							Eastern cottonwood	90	7	
3720:										
Racoon	4W	Slight	Severe	Moderate	Severe	Severe	Green ash	---	---	Red maple, water tupelo, pin oak, baldcypress.
							White oak	---	---	
							Post oak	80	4	
							Pin oak	80	4	

* Volume of wood fiber is the yield in cubic meters per hectare per year calculated at the age of culmination of the mean annual increment for fully stocked natural stands.

Recreation

Van Buren County has numerous recreational areas. Lake Sugema, a 575-acre lake south of Keosauqua, provides a variety of recreational opportunities, including excellent fishing for bluegill, largemouth bass, black crappie, saugeye, and channel catfish (fig. 16). The Des Moines River, the Fox River, and numerous streams provide opportunities for water-related recreational uses. Lacey-Keosauqua State Park offers excellent facilities for hiking and picnicking.

The soils of the survey area are rated in table 14 according to limitations that affect their suitability for recreation. The ratings 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, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These 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 soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require a nearly level soil that is free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The soils are rated on the basis of soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

The interpretive ratings in this table help engineers, planners, and others to understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Figure 16.—Lake Sugema provides flood-control protection for the Indian Creek Watershed and a quality water supply for the residents of Keosauqua. It also provides excellent outdoor recreational opportunities, such as fishing, hunting, trapping, and birdwatching.

Slight means that soil properties are favorable for the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated ***slight***.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope, bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly.

The information in table 14 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 16 and interpretations for septic tank absorption fields in table 17.

Table 14.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. 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	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13B:					
Olmitz	Slight	Slight	Moderate: slope.	Slight	Slight.
Vesser	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Zook	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
23C2:					
Arispe	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
51:					
Vesser	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
51+:					
Vesser	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
51B:					
Vesser	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
54:					
Zook	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
58D:					
Douds	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
58D2:					
Douds	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
58E2:					
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
58F2:					
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
58G:					
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
65D:					
Lindley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
65D2:					
Lindley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
65E:					
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
65E2:					
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
65F2:					
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
65G:					
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
80B:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
80C:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
80C2:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
80D:					
Clinton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
80D2:					
Clinton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
130:					
Belinda	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
131B:					
Pershing	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
131B2:					
Pershing	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
131C:					
Pershing--------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
131C2:					
Pershing--------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
132B:					
Weller----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
132C:					
Weller----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
132C2:					
Weller----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
139:					
Perks-----------	Severe: flooding.	Slight-----------	Slight-----------	Slight-----------	Severe: droughty.
139B:					
Perks-----------	Severe: flooding.	Slight-----------	Moderate: slope.	Slight-----------	Severe: droughty.
172:					
Wabash----------	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
173:					
Hoopeston-------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
179D2:					
Gara------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight-----------	Moderate: slope.
179E2:					
Gara------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
197:					
Reedscreek------	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Slight-----------	Severe: small stones.
208:					
Klum------------	Severe: flooding.	Slight-----------	Moderate: flooding.	Slight-----------	Moderate: flooding.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
211:					
Edina	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
220:					
Nodaway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
222C2:					
Clarinda	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
223C2:					
Rinda	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
231:					
Edina	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
260:					
Beckwith	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
261:					
Appanoose	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
263:					
Okaw	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
273B:					
Olmitz	Slight	Slight	Moderate: slope.	Slight	Slight.
273C:					
Olmitz	Slight	Slight	Severe: slope.	Slight	Slight.
312B:					
Seymour	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
312B2:					
Seymour	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
313D2:					
Gosport	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope, depth to rock.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
313E2:					
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
313F2:					
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
313G:					
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
315:					
Nodaway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Klum	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Perks	Severe: flooding.	Slight	Slight	Slight	Severe: droughty.
362:					
Haig	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
363:					
Haig	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
364B:					
Grundy	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
364B2:					
Grundy	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
423D2:					
Bucknell	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
424D2:					
Lindley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Keswick	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
424E2:					
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Keswick	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: erodes easily.	Severe: slope.
425D:					
Keswick	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope.
425D2:					
Keswick	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.
432C2:					
Gorin	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness.
432D:					
Gorin	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
432D2:					
Gorin	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
453:					
Tuskeego	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
460:					
Mt. Sterling	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
520:					
Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
520B:					
Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
531B:					
Kniffin	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
531B2:					
Kniffin	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
531C2:					
Kniffin	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Slight.
532B:					
Rathbun	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
532C:					
Rathbun	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Slight.
532C2:					
Rathbun	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Slight.
534:					
Carlow	Severe: flooding, wetness, percs slowly.	Severe: wetness, too clayey, percs slowly.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
592D2:					
Mystic	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope.
594D2:					
Galland	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.
598G:					
Bucklick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
599G:					
Nordness	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Gosport	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
632B:					
Adco	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
699G:					
Nordness	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Bentonsport	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: large stones, slope.
719B:					
Creal	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
720:					
Racoon	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
729:					
Nodaway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
730B:					
Nodaway	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Cantril	Severe: flooding.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
792D2:					
Armstrong	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope.
795C2:					
Ashgrove	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
795D:					
Ashgrove	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
795D2:					
Ashgrove	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
831B:					
Pershing	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
831C2:					
Pershing	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
832B:					
Weller	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
832C:					
Weller	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
832C2:					
Weller	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
832D2:					
Weller	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
880B:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
880C:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
880C2:					
Clinton	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
880D:					
Clinton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
880D2:					
Clinton	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
977:					
Richwood	Slight	Slight	Slight	Slight	Slight.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
993D2:					
Gara	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Armstrong	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Moderate: wetness, slope.
994D2:					
Galland	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.
Douds	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
994E2:					
Galland	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: erodes easily.	Severe: slope.
Douds	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
1130:					
Belinda	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
1260:					
Beckwith	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
1715:					
Nodaway	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Vesser	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Mt. Sterling	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
1977:					
Keosauqua	Slight	Slight	Moderate: slope.	Slight	Slight.
3051:					
Vesser	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
3054:					
Zook	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
3133:					
Colo	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
3139:					
Perks	Severe: flooding.	Slight	Slight	Slight	Severe: droughty.
3208:					
Klum	Severe: flooding.	Slight	Slight	Slight	Slight.
3220:					
Nodaway	Severe: flooding.	Slight	Slight	Slight	Slight.
3315:					
Nodaway	Severe: flooding.	Slight	Slight	Slight	Slight.
Klum	Severe: flooding.	Slight	Slight	Slight	Slight.
Perks	Severe: flooding.	Slight	Slight	Slight	Severe: droughty.
3484:					
Lawson	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
3520:					
Coppock	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
3587:					
Chequest	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
3720:					
Racoon	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
5010:					
Pits, sand and gravel	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
5020:					
Pits and Dumps	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
5030:					
Pits, limestone quarries	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.

Table 14.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
5040:					
Orthents	Slight	Slight	Moderate: slope.	Slight	Slight.
5047:					
Aquents	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

Wildlife Habitat

Van Buren County supports a variety of wildlife species. These wildlife resources have a positive effect on the local economy by providing opportunities for hunting, fishing, and wildlife observation. Songbirds, hawks, owls, snakes, and other predators provide additional benefits by controlling rodents and undesirable insects.

Through their influence on vegetation and land use, soil types indirectly affect both the diversity and abundance of wildlife in Van Buren County. Topography also plays a role in determining the kind and abundance of wildlife throughout the county. The nearly level Edina and Haig soils are row cropped intensively and provide only limited shelter and nesting areas for wildlife unless special provisions are made. These provisions include leaving brushy or herbaceous fence rows undisturbed; delaying mowing of set-aside areas, waterways, and other odd areas; and planting wildlife food and cover plots. The moderately steep and steep areas throughout the county, such as areas of Lindley and Gara soils, are important to wildlife because they are generally cropped less intensively than other areas. The diversity and interspersion of woodland, pastures, brushy ravines, and cropland associated with these steeper soils result in more diverse and abundant wildlife resources.

Pheasant, cottontail rabbit, raccoon, skunk, and opossum are generally abundant in the upland flats and moderately sloping areas of the county. White-tailed deer and bobwhite quail are abundant in areas of the Lindley-Rathbun-Keswick and Weller-Lindley-Keswick associations where the flat uplands break off into moderately sloping and steeper topography. These associations are described under the heading “General Soil Map Units” in Part I of this survey. Wild turkeys are abundant in the more extensive woodlands associated with the steeper soils, such as Lindley loam, 25 to 40 percent slopes. Mink, muskrat, and some beaver frequent the Des Moines River, the Fox River, and various creeks throughout the county.

The remaining undrained wetland areas along the Des Moines and Fox Rivers and other streams in the county provide habitat for waterfowl and other wetland wildlife. The most common nesting waterfowl species in the county is the wood duck, which nests in hollow trees along the larger streams and rivers. Old bayous, cut-off channels, and other shallow water areas along these streams provide important brood areas where young wood ducks can find food and protection from predators. Lake Sugema, a 575-acre lake south of Keosauqua, also provides an important nesting and brood-rearing area for wood ducks and other waterfowl. Various other marsh birds, including herons, egrets, and shorebirds, use this lake and the shallow water areas associated with the larger streams in the county for feeding or nesting. Giant Canada geese nest on Lake Sugema and on some of the larger farm ponds in the county. Nodaway and Coppock soils on bottom land provide sites for dikes and shallow water impoundments, which can improve habitat for waterfowl and other wetland wildlife. Several wetlands have been developed and/or restored along the Fox River, and significant potential for additional wetland restoration exists along this stream.

Fish, mainly bullheads and carp, are fairly plentiful in the streams throughout the county. Channel catfish are the most sought-after species in the Des Moines River. Many privately owned artificial ponds are well distributed throughout the county. These well managed ponds provide excellent fishing for large-mouth bass, bluegill, and channel catfish (fig. 17). Internal drainage, available water capacity, texture of the subsoil, and permeability are important factors affecting the selection of sites for farm ponds and shallow water areas for waterfowl.

Although many areas in the county are suitable as wildlife habitat, many more could be improved or developed. A variety of wildlife species would benefit by such practices as creating wildlife food plots; delaying mowing along waterways and terraces and in odd areas and set-aside areas; using a pasture rotation system that incorporates warm-season native grasses; and maintaining brushy and herbaceous fence rows as travel lanes for wildlife. Small irregularly shaped areas that have limited value for other uses could be developed as wildlife habitat by planting trees, shrubs, and native grasses or by merely fencing the areas and allowing natural succession to occur.

Figure 17.—An island constructed for use as a fishing access in a pond.

Woodlands can be made more productive for timber and wildlife by excluding livestock from the stands. Minimizing or eliminating fall tillage of crop fields helps to prevent erosion and provides winter food for wildlife. Incorporating islands and other habitat-enhancing features in the design of new farm ponds and shallow water areas provides safe nesting areas for Canada geese and other waterfowl.

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. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

If the soils have potential for habitat development, wildlife habitat can be created or improved by planting appropriate vegetation, properly managing the existing plant cover, and fostering the natural establishment of desirable plants.

In table 15, 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 used by wildlife. Examples are corn, soybeans, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are bromegrass, timothy, orchardgrass, clover, alfalfa, wheatgrass, and birdsfoot trefoil.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestems, indiangrass, goldenrod, lambsquarters, dandelions, ragweed, wheatgrass, and nightshade.

The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, salinity, and flooding. The length of the growing season also is important.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are bur oak, post oak, white oak, black oak, and eastern redcedar. Purple coneflowers grow in the hills, and willow and cottonwood are common in areas of bottom land. Examples of fruit-producing shrubs that are suitable for planting on soils that have good potential for these plants are elderberry, raspberry, gooseberry, honeysuckle, American plum, dogwoods, highbush cranberry, crabapple, mulberry, and chokecherry.

Coniferous plants are cone-bearing trees, shrubs, or ground-cover plants that provide habitat or supply food in the form of browse, seed, or fruitlike cones. Examples are redcedar and spruce.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of the root zone, the amount of water available to plants, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweeds, wild millet, rushes, sedges, bulrushes, arrowhead, water plantain, cattail, prairie cordgrass, bluejoint grass, asters, and beggarticks.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are soil texture, wetness, slope, and permeability.

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, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include Hungarian partridge, ring-necked pheasant, bobwhite quail, meadowlark, field sparrow, killdeer, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of hardwoods or conifers or a mixture of these and associated grasses, legumes, and wild herbaceous plants. The wildlife attracted to this habitat include wild turkey, ruffed grouse, thrushes, woodpeckers, owls, tree squirrels, wild turkeys, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas, bogs, or flood plains that support water-tolerant plants. The wildlife attracted to this habitat include ducks, geese, herons, bitterns, rails, kingfishers, muskrat, otter, mink, and beaver.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
13B:										
Olmitz	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
23C2:										
Arispe	Good	Good	Good	Good	Good	Very poor.	Poor	Good	Good	Very poor.
51:										
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
51+:										
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
51B:										
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
54:										
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
58D:										
Douds	Fair	Good	Fair	Good	Fair	Poor	Poor	Fair	Good	Poor.
58D2:										
Douds	Fair	Good	Fair	Good	Fair	Poor	Poor	Fair	Good	Poor.
58E2:										
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
58F2:										
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
58G:										
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
65D:										
Lindley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
65D2:										
Lindley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
65E:										
Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
65E2:										
Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
65F2: Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
65G: Lindley	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
80B: Clinton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
80C: Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
80C2: Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
80D: Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
80D2: Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
130: Belinda	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
131B: Pershing	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
131B2: Pershing	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
131C: Pershing	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
131C2: Pershing	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
132B: Weller	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
132C: Weller	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
132C2: Weller	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
139: Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
139B: Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
172:										
Wabash----------	Poor	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
173:										
Hoopeston-------	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
179D2:										
Gara------------	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Poor.
179E2:										
Gara------------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
197:										
Reedscreek------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
208:										
Klum------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
211:										
Edina-----------	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
220:										
Nodaway---------	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
222C2:										
Clarinda--------	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
223C2:										
Rinda-----------	Poor	Fair	Poor	Fair	Poor	Very poor.	Very poor.	Fair	Fair	Very poor.
231:										
Edina-----------	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
260:										
Beckwith--------	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
261:										
Appanoose-------	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
263:										
Okaw------------	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
273B:										
Olmitz----------	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
273C:										
Olmitz----------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
312B:										
Seymour---------	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
312B2:										
Seymour---------	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
313D2:										
Gosport---------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
313E2:										
Gosport	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
313F2:										
Gosport	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
313G:										
Gosport	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
315:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
Klum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
362:										
Haig	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
363:										
Haig	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
364B:										
Grundy	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
364B2:										
Grundy	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
423D2:										
Bucknell	Fair	Good	Fair	Good	Fair	Poor	Poor	Fair	Good	Very poor.
424D2:										
Lindley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Keswick	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
424E2:										
Lindley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Keswick	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
425D:										
Keswick	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
425D2:										
Keswick	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
432C2:										
Gorin	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
432D:										
Gorin-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
432D2:										
Gorin-----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
453:										
Tuskeego--------	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
460:										
Mt. Sterling----	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
520:										
Coppock---------	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
520B:										
Coppock---------	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
531B:										
Kniffin---------	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
531B2:										
Kniffin---------	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
531C2:										
Kniffin---------	Fair	Good	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
532B:										
Rathbun---------	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
532C:										
Rathbun---------	Fair	Good	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
532C2:										
Rathbun---------	Fair	Good	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
534:										
Carlow----------	Poor	Fair	Fair	Fair	Fair	Poor	Good	Poor	Fair	Fair.
592D2:										
Mystic----------	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
594D2:										
Galland---------	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
598G:										
Bucklick--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
599G:										
Nordness--------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Gosport---------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
632B:										
Adco	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
699G:										
Nordness	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bentonsport	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
719B:										
Creal	Good	Good	Fair	Good	Good	Fair	Fair	Good	Good	Fair.
720:										
Racoon	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
729:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
Coppock	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
730B:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
Coppock	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Cantril	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
792D2:										
Armstrong	Fair	Good	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
795C2:										
Ashgrove	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
795D:										
Ashgrove	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
795D2:										
Ashgrove	Poor	Fair	Poor	Fair	Poor	Poor	Poor	Fair	Fair	Poor.
831B:										
Pershing	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
831C2:										
Pershing	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
832B:										
Weller	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor.
832C:										
Weller	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
832C2:										
Weller	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.
832D2:										
Weller	Fair	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Fair	Very poor.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
880B:										
Clinton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
880C:										
Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
880C2:										
Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
880D:										
Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
880D2:										
Clinton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
977:										
Richwood	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
993D2:										
Gara	Fair	Good	Fair	Good	Good	Very poor.	Poor	Fair	Good	Poor.
Armstrong	Fair	Good	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
994D2:										
Galland	Fair	Good	Fair	Good	Fair	Very poor.	Poor	Fair	Good	Very poor.
Douds	Fair	Good	Fair	Good	Fair	Poor	Poor	Fair	Good	Poor.
994E2:										
Galland	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
Douds	Very poor.	Good	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
1130:										
Belinda	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
1260:										
Beckwith	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
1715:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
1977:										
Keosauqua	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3051:										
Vesser	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.

Table 15.--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	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
3054:										
Zook	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
3133:										
Colo	Good	Fair	Good	Fair	Poor	Good	Good	Fair	Fair	Good.
3139:										
Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
3208:										
Klum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3220:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
3315:										
Nodaway	Good	Good	Good	Good	Fair	Fair	Poor	Fair	Good	Fair.
Klum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Perks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
3484:										
Lawson	Good	Good	Fair	Good	Good	Fair	Fair	Good	Good	Fair.
3520:										
Coppock	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
3587:										
Chequest	Good	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
3720:										
Racoon	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
5010:										
Pits, sand and gravel	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
5020:										
Pits and Dumps	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
5030:										
Pits, limestone quarries	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
5040:										
Orthents.										
5047:										
Aquents.										

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the 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 within a depth of 5 or 6 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 grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, 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

Table 16 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered ***slight*** if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; ***moderate*** if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and ***severe*** if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and ***small commercial buildings*** are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

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 stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, potential for frost action, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 17 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. It also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of ***slight, moderate,*** or ***severe*** are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of ***good, fair,*** and ***poor*** are given for daily cover for landfill.

A rating of ***slight*** or ***good*** indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of ***moderate*** or ***fair*** indicates that the limitations should be recognized but generally can be overcome by good management or special design. A rating of ***severe*** or ***poor*** indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. The soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

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, relatively impervious soil material. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is desirable to minimize seepage and contamination of local ground water.

Table 17 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive 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 and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2 feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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 suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, rock fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Waste Management

Soil properties are important when organic waste is applied as fertilizer and wastewater is applied in irrigated areas. They also are important when the soil is used as a medium for the treatment and disposal of the organic waste and wastewater. Unfavorable soil properties can result in environmental damage.

The use of organic waste and wastewater as production resources results in energy and resource conservation and minimizes the problems associated with waste disposal. If disposal is the goal, applying a maximum amount of the organic waste or the wastewater to a minimal area holds costs to a minimum and environmental damage is the main hazard. If reuse is the goal, a minimum amount should be applied to a maximum area and environmental damage is unlikely.

Interpretations developed for waste management may include ratings for manure- and food-processing waste, municipal sewage sludge, use of wastewater for irrigation, and treatment of wastewater by slow rate, overland flow, and rapid infiltration processes.

Specific information regarding waste management is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Construction Materials

Table 18 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated ***good, fair,*** or ***poor*** as a source of roadfill and topsoil. They are rated as a ***probable*** or ***improbable*** source of sand and gravel.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the 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 soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high 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 engineering classification of the soil) and shrink-swell potential.

Soils rated ***good*** contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated ***fair*** are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated ***poor*** have one or more of the following characteristics: a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

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 the table, only the probability of finding material in suitable quantity in or below the soil 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 engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated ***good*** have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated ***fair*** are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated ***poor*** are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils generally is 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 19 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 limitations are considered ***slight*** if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; ***moderate*** if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and ***severe*** if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In the 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 more 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.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff.

Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Table 16.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13B:						
Olmitz	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
Vesser	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Zook	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
23C2:						
Arispe	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
51:						
Vesser	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
51+:						
Vesser	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
51B:						
Vesser	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
54:						
Zook	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
58D:						
Douds	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
58D2:						
Douds	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
58E2:						
Douds	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
58F2:						
Douds-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
58G:						
Douds-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
65D:						
Lindley---------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
65D2:						
Lindley---------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
65E:						
Lindley---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
65E2:						
Lindley---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
65F2:						
Lindley---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
65G:						
Lindley---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
80B:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
80C:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
80C2:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
80D:						
Clinton---------	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
80D2:						
Clinton	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
130:						
Belinda	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
131B:						
Pershing	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
131B2:						
Pershing	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
131C:						
Pershing	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
131C2:						
Pershing	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
132B:						
Weller	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
132C:						
Weller	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
132C2:						
Weller	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
139:						
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
139B:						
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
172:						
Wabash----------	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, too clayey.
173:						
Hoopeston-------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
179D2:						
Gara------------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
179E2:						
Gara------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
197:						
Reedscreek------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones.
208:						
Klum------------	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
211:						
Edina-----------	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
220:						
Nodaway---------	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
222C2:						
Clarinda--------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
223C2:						
Rinda-----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
231:						
Edina-----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
260:						
Beckwith--------	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
261:						
Appanoose	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
263:						
Okaw	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
273B:						
Olmitz	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
273C:						
Olmitz	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
312B:						
Seymour	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
312B2:						
Seymour	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
313D2:						
Gosport	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Moderate: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope, depth to rock.
313E2:						
Gosport	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
313F2:						
Gosport	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
313G:						
Gosport	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
315:						
Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
315:						
Klum	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
362:						
Haig	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
363:						
Haig	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
364B:						
Grundy	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
364B2:						
Grundy	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
423D2:						
Bucknell	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
424D2:						
Lindley	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Keswick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
424E2:						
Lindley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Keswick	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
425D:						
Keswick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
425D2:						
Keswick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
432C2:						
Gorin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
432D:						
Gorin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, slope.
432D2:						
Gorin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, slope.
453:						
Tuskeego	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
460:						
Mt. Sterling	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
520:						
Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
520B:						
Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
531B:						
Kniffin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
531B2:						
Kniffin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
531C2:						
Kniffin	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
532B:						
Rathbun	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
532C:						
Rathbun	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
532C2:						
Rathbun	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
534:						
Carlow	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, too clayey.
592D2:						
Mystic	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
594D2:						
Galland	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
598G:						
Bucklick	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
599G:						
Nordness	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: slope, depth to rock.
Gosport	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
632B:						
Adco	Moderate: too clayey, wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
699G:						
Nordness	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: slope, depth to rock.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
699G:						
Bentonsport	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
719B:						
Creal	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: frost action.	Moderate: wetness.
720:						
Racoon	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
729:						
Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
730B:						
Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
Cantril	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Slight.
792D2:						
Armstrong	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
795C2:						
Ashgrove	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
795D:						
Ashgrove	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, slope.
795D2:						
Ashgrove	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, slope.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
831B:						
Pershing--------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
831C2:						
Pershing--------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
832B:						
Weller----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
832C:						
Weller----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
832C2:						
Weller----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
832D2:						
Weller----------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, frost action.	Moderate: slope.
880B:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
880C:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
880C2:						
Clinton---------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
880D:						
Clinton---------	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
880D2:						
Clinton---------	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
977:						
Richwood	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
993D2:						
Gara	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Armstrong	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
994D2:						
Galland	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
Douds	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
994E2:						
Galland	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Douds	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
1130:						
Belinda	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
1260:						
Beckwith	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
1715:						
Nodaway	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
Vesser	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
Mt. Sterling	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1977:						
Keosauqua	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
3051:						
Vesser	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
3054:						
Zook	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
3133:						
Colo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
3139:						
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
3208:						
Klum	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
3220:						
Nodaway	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
3315:						
Nodaway	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
Klum	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Perks	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
3484:						
Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness.
3520:						
Coppock	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, frost action.	Moderate: wetness.
3587:						
Chequest	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3720:						
Racoon----------	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding.	Severe: low strength, ponding.	Severe: ponding.
5010:						
Pits, sand and gravel---------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
5020:						
Pits and Dumps--	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
5030:						
Pits, limestone quarries-------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
5040:						
Orthents--------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
5047:						
Aquents---------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.

Table 17.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. 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	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13B:					
Olmitz	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Vesser	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Zook	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
23C2:					
Arispe	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Poor: hard to pack.
51:					
Vesser	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
51+:					
Vesser	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
51B:					
Vesser	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
54:					
Zook	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
58D:					
Douds	Moderate: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: seepage.	Fair: too clayey, too sandy, slope.
58D2:					
Douds	Moderate: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: seepage.	Fair: too clayey, too sandy, slope.
58E2:					
Douds	Severe: slope.	Severe: seepage, slope.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: slope.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
58F2:					
Douds	Severe: slope.	Severe: seepage, slope.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: slope.
58G:					
Douds	Severe: slope.	Severe: seepage, slope.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: slope.
65D:					
Lindley	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
65D2:					
Lindley	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
65E:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
65E2:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
65F2:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
65G:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
80B:					
Clinton	Severe: percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
80C:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
80C2:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
80D:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
80D2:					
Clinton---------	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
130:					
Belinda---------	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
131B:					
Pershing--------	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
131B2:					
Pershing--------	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
131C:					
Pershing--------	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
131C2:					
Pershing--------	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
132B:					
Weller----------	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
132C:					
Weller----------	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
132C2:					
Weller----------	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
139:					
Perks-----------	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
139B:					
Perks-----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
172:					
Wabash----------	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
173:					
Hoopeston	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
179D2:					
Gara	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
179E2:					
Gara	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
197:					
Reedscreek	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, depth to rock, seepage.	Severe: flooding, seepage.	Poor: large stones.
208:					
Klum	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage.
211:					
Edina	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
220:					
Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
222C2:					
Clarinda	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
223C2:					
Rinda	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
231:					
Edina	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
260:					
Beckwith	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
261:					
Appanoose	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
263:					
Okaw	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
273B:					
Olmitz	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
273C:					
Olmitz	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
312B:					
Seymour	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
312B2:					
Seymour	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
313D2:					
Gosport	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
313E2:					
Gosport	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
313F2:					
Gosport	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
313G:					
Gosport	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
315:					
Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Klum	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
315:					
Perks	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
362:					
Haig	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
363:					
Haig	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
364B:					
Grundy	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
364B2:					
Grundy	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
423D2:					
Bucknell	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
424D2:					
Lindley	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Keswick	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
424E2:					
Lindley	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Keswick	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope.	Severe: wetness, slope.	Poor: slope, wetness.
425D:					
Keswick	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
425D2:					
Keswick	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
432C2:					
Gorin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
432D:					
Gorin	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
432D2:					
Gorin	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
453:					
Tuskeego	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
460:					
Mt. Sterling	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
520:					
Coppock	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
520B:					
Coppock	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
531B:					
Kniffin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
531B2:					
Kniffin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
531C2:					
Kniffin	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
532B:					
Rathbun	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
532C:					
Rathbun	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
532C2:					
Rathbun	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
534:					
Carlow	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
592D2:					
Mystic	Severe: wetness, percs slowly.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack.
594D2:					
Galland	Severe: wetness, percs slowly.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack.
598G:					
Bucklick	Severe: slope.	Severe: slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: too clayey, slope.
599G:					
Nordness	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Gosport	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
632B:					
Adco	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
699G:					
Nordness	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Bentonsport	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, hard to pack, large stones.
719B:					
Creal	Severe: wetness, percs slowly.	Severe: wetness.	Severe: cemented pan, wetness.	Severe: wetness.	Fair: too clayey, wetness.
720:					
Racoon	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
729:					
Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Coppock	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
730B:					
Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Coppock	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
Cantril	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
792D2:					
Armstrong	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
795C2:					
Ashgrove	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
795D:					
Ashgrove	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
795D2:					
Ashgrove	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
831B:					
Pershing	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
831C2:					
Pershing	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
832B:					
Weller	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
832C:					
Weller	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
832C2:					
Weller	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
832D2:					
Weller	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
880B:					
Clinton	Severe: percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
880C:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
880C2:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
880D:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
880D2:					
Clinton	Severe: percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
977:					
Richwood	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
993D2:					
Gara	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Armstrong	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
994D2:					
Galland	Severe: wetness, percs slowly.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack.
Douds	Moderate: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, wetness.	Severe: seepage.	Fair: too clayey, too sandy, slope.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
994E2:					
Galland	Severe: wetness, percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, wetness, slope.	Severe: wetness, slope.	Poor: too clayey, hard to pack, slope.
Douds	Severe: slope.	Severe: seepage, slope.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: slope.
1130:					
Belinda	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
1260:					
Beckwith	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
1715:					
Nodaway	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Vesser	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Zook	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
1977:					
Keosauqua	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
3051:					
Vesser	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
3054:					
Zook	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
3133:					
Colo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
3139:					
Perks	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
3208:					
Klum	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage.
3220:					
Nodaway	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
3315:					
Nodaway	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Klum	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage.
Perks	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
3484:					
Lawson	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
3520:					
Coppock	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
3587:					
Chequest	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
3720:					
Racoon	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
5010:					
Pits, sand and gravel	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
5020:					
Pits and Dumps	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
5030:					
Pits, limestone quarries	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
5040:					
Orthents	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good
5047:					
Aquents	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

Table 18.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. 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	Roadfill	Sand	Gravel	Topsoil
13B:				
Olmitz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Zook	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
23C2:				
Arispe	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
51:				
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
51+:				
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
51B:				
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
54:				
Zook	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
58D:				
Douds	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
58D2:				
Douds	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
58E2:				
Douds	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
58F2:				
Douds	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
58G:				
Douds	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
65D:				
Lindley---------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
65D2:				
Lindley---------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
65E:				
Lindley---------	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
65E2:				
Lindley---------	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
65F2:				
Lindley---------	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
65G:				
Lindley---------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
80B:				
Clinton---------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
80C:				
Clinton---------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
80C2:				
Clinton---------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
80D:				
Clinton---------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
80D2:				
Clinton---------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
130:				
Belinda---------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
131B:				
Pershing--------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
131B2:				
Pershing--------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
131C:				
Pershing	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
131C2:				
Pershing	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
132B:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
132C:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
132C2:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
139:				
Perks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
139B:				
Perks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
172:				
Wabash	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
173:				
Hoopeston	Fair: wetness.	Probable	Improbable: too sandy.	Fair: small stones, thin layer.
179D2:				
Gara	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
179E2:				
Gara	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
197:				
Reedscreek	Fair: depth to rock, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
208:				
Klum	Good	Probable	Improbable: too sandy.	Good.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
211:				
Edina	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
220:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
222C2:				
Clarinda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
223C2:				
Rinda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
231:				
Edina	Poor: shrink-swell, low strength. wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
260:				
Beckwith	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
261:				
Appanoose	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
263:				
Okaw	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
273B:				
Olmitz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
273C:				
Olmitz	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
312B:				
Seymour	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
312B2:				
Seymour	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
313D2:				
Gosport	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
313E2:				
Gosport	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
313F2:				
Gosport	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
313G:				
Gosport	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
315:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Klum	Good	Probable	Improbable: too sandy.	Good.
Perks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
362:				
Haig	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
363:				
Haig	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
364B:				
Grundy	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
364B2:				
Grundy	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
423D2:				
Bucknell	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
424D2:				
Lindley	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
424E2:				
Lindley	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
425D:				
Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
425D2:				
Keswick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
432C2:				
Gorin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
432D:				
Gorin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
432D2:				
Gorin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
453:				
Tuskeego	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
460:				
Mt. Sterling	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
520:				
Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
520B:				
Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
531B:				
Kniffin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
531B2:				
Kniffin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
531C2:				
Kniffin	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
532B:				
Rathbun	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
532C:				
Rathbun	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
532C2:				
Rathbun	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
534:				
Carlow	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
592D2:				
Mystic	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
594D2:				
Galland	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
598G:				
Bucklick	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, slope.
599G:				
Nordness	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Gosport	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
632B:				
Adco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
699G:				
Nordness	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Bentonsport	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
719B:				
Creal	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
720:				
Racoon	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
729:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
730B:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Cantril	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
792D2:				
Armstrong	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
795C2:				
Ashgrove	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
795D:				
Ashgrove	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
795D2:				
Ashgrove	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
831B:				
Pershing	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
831C2:				
Pershing	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
832B:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
832C:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
832C2:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
832D2:				
Weller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
880B:				
Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
880C:				
Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
880C2:				
Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
880D:				
Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
880D2:				
Clinton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
977:				
Richwood	Good	Probable	Improbable: too sandy.	Good.
993D2:				
Gara	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
Armstrong	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
994D2:				
Galland	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Douds	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
994E2:				
Galland	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Douds	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
1130:				
Belinda	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1260:				
Beckwith	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
1715:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Mt. Sterling	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
1977:				
Keosauqua	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
3051:				
Vesser	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
3054:				
Zook	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3133:				
Colo	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
3139:				
Perks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3208:				
Klum	Good	Probable	Improbable: too sandy.	Good.
3220:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
3315:				
Nodaway	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Klum	Good	Probable	Improbable: too sandy.	Good.
Perks	Good	Probable	Improbable: too sandy.	Poor: too sandy.
3484:				
Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
3520:				
Coppock	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

Table 18.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
3587: Chequest	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
3720: Racoon	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
5010: Pits, sand and gravel	Good	Probable	Probable	Poor: too sandy.
5020: Pits and Dumps	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
5030: Pits, limestone quarries	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
5040: Orthents	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
5047: Aquents	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

Table 19.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. 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	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
13B:							
Olmitz	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Vesser	Moderate: seepage, slope.	Severe: wetness.	Moderate: slow refill.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
Zook	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
23C2:							
Arispe	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
51:							
Vesser	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
51+:							
Vesser	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
51B:							
Vesser	Moderate: seepage, slope.	Severe: wetness.	Moderate: slow refill.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
54:							
Zook	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
58D:							
Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
58D2: Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
58E2: Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
58F2: Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
58G: Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
65D: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
65D2: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
65E: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
65E2: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
65F2: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
65G: Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
80B: Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
80C: Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
80C2: Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
80D: Clinton	Severe: slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
80D2: Clinton	Severe: slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
130: Belinda	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
131B: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
131B2: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
131C: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
131C2: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
132B: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
132C: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
132C2: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
139: Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
139B: Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
172: Wabash	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, droughty, slow intake.	Wetness, percs slowly.	Wetness, droughty, percs slowly.
173: Hoopeston	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, soil blowing.	Wetness, too sandy, soil blowing.	Wetness.
179D2: Gara	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
179E2: Gara	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
197: Reedscreek	Severe: seepage.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, flooding.	Large stones	Large stones, droughty.
208: Klum	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing, flooding.	Soil blowing	Favorable.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
211:							
Edina	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
220:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Flooding	Erodes easily	Erodes easily.
222C2:							
Clarinda	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
223C2:							
Rinda	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
231:							
Edina	Slight	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
260:							
Beckwith	Slight	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
261:							
Appanoose	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
263:							
Okaw	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
273B:							
Olmitz	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
273C:							
Olmitz	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Slope	Favorable	Favorable.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
312B:							
Seymour	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
312B2:							
Seymour	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
313D2:							
Gosport	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
313E2:							
Gosport	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
313F2:							
Gosport	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
313G:							
Gosport	Severe: slope.	Slight	Severe: no water.	Percs slowly, depth to rock, slope.	Slope, wetness, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
315:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Flooding	Erodes easily	Erodes easily.
Klum	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing, flooding.	Soil blowing	Favorable.
Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
362:							
Haig	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
363:							
Haig	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
364B:							
Grundy	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
364B2:							
Grundy	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Wetness, erodes easily.
423D2:							
Bucknell	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
424D2:							
Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Keswick	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
424E2:							
Lindley	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Keswick	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
425D:							
Keswick	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
425D2:							
Keswick	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
432C2: Gorin	Moderate: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
432D: Gorin	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
432D2: Gorin	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
453: Tuskeego	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
460: Mt. Sterling	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
520: Coppock	Moderate: seepage.	Severe: hard to pack, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
520B: Coppock	Moderate: seepage, slope.	Severe: hard to pack, wetness.	Moderate: slow refill.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
531B: Kniffin	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
531B2: Kniffin	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
531C2:							
Kniffin	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
532B:							
Rathbun	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
532C:							
Rathbun	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
532C2:							
Rathbun	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
534:							
Carlow	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding.	Wetness, droughty, slow intake.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, droughty.
592D2:							
Mystic	Severe: seepage, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
594D2:							
Galland	Severe: seepage, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
598G:							
Bucklick	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope	Slope.
599G:							
Nordness	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Gosport	Severe: slope.	Slight	Severe: no water.	Percs slowly, depth to rock, slope.	Slope, wetness, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
632B:							
Adco	Slight	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
699G:							
Nordness	Severe: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Bentonsport	Severe: slope.	Severe: hard to pack, large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
719B:							
Creal	Moderate: slope.	Severe: thin layer, wetness.	Severe: slow refill.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
720:							
Racoon	Slight	Severe: thin layer, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly, flooding.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
729:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Flooding	Erodes easily	Erodes easily.
Coppock	Moderate: seepage.	Severe: hard to pack, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
730B:							
Nodaway	Moderate: seepage, slope.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Slope, flooding.	Erodes easily	Erodes easily.
Coppock	Moderate: seepage, slope.	Severe: hard to pack, wetness.	Moderate: slow refill.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
Cantril	Moderate: seepage, slope.	Moderate: wetness.	Moderate: deep to water, slow refill.	Frost action, slope.	Slope, wetness, rooting depth.	Wetness	Rooting depth.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
792D2: Armstrong	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
795C2: Ashgrove	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
795D: Ashgrove	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
795D2: Ashgrove	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
831B: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
831C2: Pershing	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
832B: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
832C: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
832C2: Weller	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
832D2:							
Weller	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
880B:							
Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
880C:							
Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
880C2:							
Clinton	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
880D:							
Clinton	Severe: slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
880D2:							
Clinton	Severe: slope.	Moderate: hard to pack.	Severe: slow refill.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
977:							
Richwood	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable	Erodes easily	Erodes easily.
993D2:							
Gara	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
Armstrong	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, wetness, percs slowly.	Wetness, slope, percs slowly.
994D2:							
Galland	Severe: seepage, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for--: Pond reservoir areas	Limitations for--: Embankments, dikes, and levees	Limitations for--: Aquifer-fed excavated ponds	Features affecting--: Drainage	Features affecting--: Irrigation	Features affecting--: Terraces and diversions	Features affecting--: Grassed waterways
994D2:							
Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
994E2:							
Galland	Severe: seepage, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
Douds	Severe: seepage, slope.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, rooting depth.	Slope, too sandy.	Slope, rooting depth.
1130:							
Belinda	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
1260:							
Beckwith	Slight	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
1715:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Flooding	Erodes easily	Erodes easily.
Vesser	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Mt. Sterling	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
1977:							
Keosauqua	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
3051:							
Vesser	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
3054:							
Zook	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
3133:							
Colo	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action	Wetness	Wetness	Wetness.
3139:							
Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
3208:							
Klum	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Soil blowing	Favorable.
3220:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable	Erodes easily	Erodes easily.
3315:							
Nodaway	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable	Erodes easily	Erodes easily.
Klum	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Soil blowing	Favorable.
Perks	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty, rooting depth.
3484:							
Lawson	Moderate: seepage.	Severe: wetness.	Moderate: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
3520:							
Coppock	Moderate: seepage.	Severe: hard to pack, wetness.	Moderate: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.

Table 19.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
3587: Chequest	Slight	Severe: wetness.	Severe: slow refill.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
3720: Racoon	Slight	Severe: thin layer, ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
5010: Pits, sand and gravel	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy	Droughty.
5020: Pits and Dumps	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
5030: Pits, limestone quarries	Severe: depth to rock, slope.	Slight	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
5040: Orthents	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Slope, droughty.	Soil blowing	Droughty.
5047: Aquents	Slight	Severe: wetness.	Slight	Flooding	Wetness, flooding.	Wetness	Wetness.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

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

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 20 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

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. 18). "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 as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

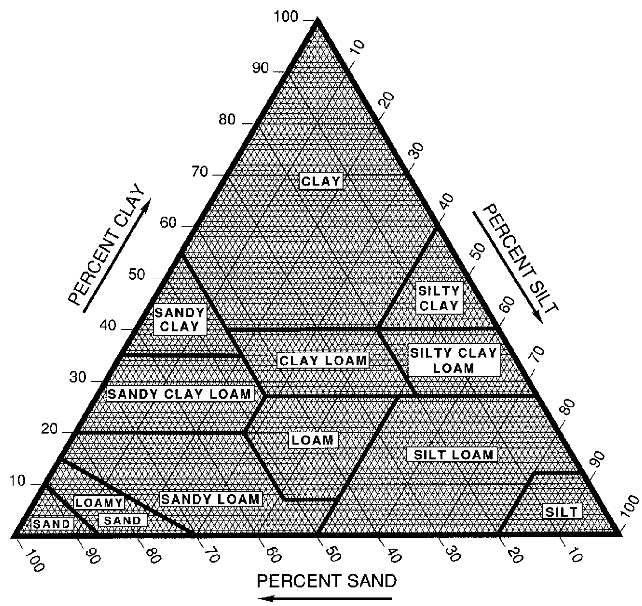

Figure 18.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

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 grain-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, SP-SM.

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 grain-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 grain-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 omitted in the table.

Physical Properties

Table 21 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major 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. The range in depth and information on other properties of each layer are given in the series descriptions in Part I of this survey.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine 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 earth-moving 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 $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In the table, the estimated moist bulk density of each major 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. A bulk density of more than 1.6 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 refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water 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 major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. 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.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are ***low***, a change of less than 3 percent; ***moderate***, 3 to 6 percent; and ***high***, 6 to 9 percent. ***Very high***, more than 9 percent, is sometimes used.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, 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 or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

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 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 resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams that have more than 5 percent finely divided calcium carbonate. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if measures to control wind erosion are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils have less than 5 percent finely divided calcium carbonate. They are moderately erodible. Crops can be grown if ordinary measures to control wind erosion are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils have less than 5 percent finely divided calcium carbonate. They are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

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 22 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.

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine 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 earth-moving operations.

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.

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.

Water Features

Table 23 gives estimates of several important water features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a seasonal high water table, the infiltration rate, permeability after prolonged wetting, and the depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very 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 a moderately fine 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 that have a moderately fine 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 clayey soils that have a high shrink-swell potential, soils that have a permanent 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.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

Table 23 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur. Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. ***None*** means that flooding is not probable; ***rare*** that it is unlikely but is possible under unusual weather conditions (the chance of flooding is nearly 0 percent 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); and ***frequent*** that it occurs often under normal weather conditions (the chance of flooding is 50 percent in any year). Duration is expressed as ***very brief*** (less than 2 days), ***brief*** (2 to 7 days), ***long*** (7 to 30 days), and ***very long*** (more than 30 days). The time of year that flooding is most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding 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 level 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.

High water table (seasonal) is a zone of saturation at the highest average depth during the wettest season. It is at least 6 inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Indicated in the table are the depth to the seasonal high water table, the kind of water table, and the months of the year when the water table usually is highest.

An ***apparent*** water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time for adjustments in the surrounding soil.

A ***perched*** water table is one that is above an unsaturated zone in the soil. The basis for determining that a water table is perched may be general knowledge of the area. The water table is proven to be perched if the water level in a borehole is observed to fall when the borehole is extended.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. 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. ***Maximum ponding depth*** refers to the depth of the water above the surface of the soil.

Soil Features

Table 24 gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Depth to bedrock is given if bedrock is within a depth of 60 inches. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

A ***low*** potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a ***moderate*** potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a ***high*** potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves 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 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 in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel 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 is also expressed as ***low, moderate,*** or ***high***. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Table 20.--Engineering Index Properties

(Absence of an entry indicates that 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	
13B:												
Olmitz----------	0-9	Loam-----------	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	9-32	Loam, clay loam	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	32-80	Clay loam------	CL	A-6, A-7	0	0	100	90-100	85-95	60-80	35-45	15-25
Vesser----------	0-12	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	12-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25
Zook------------	0-19	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
	19-37	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55
	37-80	Silty clay loam, silty clay, silt loam.	CH, CL, ML, MH	A-7, A-6	0	0	100	100	95-100	95-100	35-80	10-50
23C2:												
Arispe----------	0-9	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	9-23	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-60	25-35
	23-50	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	50-65	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	20-30
	65-80	Silty clay, clay.	CH	A-7	0	0	100	95-100	85-100	80-100	55-70	20-40
51:												
Vesser----------	0-12	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	12-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25
51+:												
Vesser----------	0-22	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	22-35	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	35-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25
51B:												
Vesser----------	0-12	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	12-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25

Table 20.--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	
54:												
Zook-----------	0-19	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
	19-37	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55
	37-80	Silty clay loam, silty clay, silt loam.	CH, CL, ML, MH	A-7, A-6	0	0	100	100	95-100	95-100	35-80	10-50
58D:												
Douds----------	0-10	Loam----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	10-54	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	54-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
58D2:												
Douds----------	0-5	Loam----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	5-51	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	51-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
58E2:												
Douds----------	0-4	Loam----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	4-49	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	49-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
58F2:												
Douds----------	0-4	Loam----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	4-47	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	47-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15

Table 20.--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	
58G:												
Douds-----------	0-10	Loam-----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	10-45	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	45-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
65D:												
Lindley---------	0-8	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	8-52	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	52-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
65D2:												
Lindley---------	0-7	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	7-43	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	43-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
65E:												
Lindley---------	0-8	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	8-50	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	50-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
65E2:												
Lindley---------	0-6	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	6-42	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	42-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
65F2:												
Lindley---------	0-5	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	5-41	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	41-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
65G:												
Lindley---------	0-8	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	8-48	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	48-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
80B:												
Clinton---------	0-9	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	9-34	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	34-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25

Table 20.--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	
80C:												
Clinton---------	0-8	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	8-33	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	33-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
80C2:												
Clinton---------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	8-28	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	28-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
80D:												
Clinton---------	0-8	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	8-32	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	32-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
80D2:												
Clinton---------	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	7-27	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	27-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
130:												
Belinda---------	0-9	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	5-15
	9-17	Silt loam------	CL-ML, CL, ML	A-4	0	0	100	100	100	95-100	25-35	5-10
	17-39	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	39-60	Silty clay loam	CH	A-7	0	0	100	100	100	95-100	50-65	25-35

Table 20.--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	
131B:												
Pershing--------	0-15	Silt loam------	CL	A-6	0	0	100	100	100	95-100	30-40	10-20
	15-17	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	17-49	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	49-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
131B2:												
Pershing--------	0-7	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	7-12	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	12-44	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	44-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
131C:												
Pershing--------	0-15	Silt loam------	CL	A-6	0	0	100	100	100	95-100	30-40	10-20
	15-17	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	17-48	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	48-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
131C2:												
Pershing--------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	6-11	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	11-42	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	42-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
132B:												
Weller----------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-47	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	47-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30

Table 20.--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	
132C:												
Weller----------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-45	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	45-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30
132C2:												
Weller----------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	6-43	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	43-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30
139:												
Perks-----------	0-9	Loamy sand-----	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
	9-80	Sand, loamy sand.	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
139B:												
Perks-----------	0-9	Loamy sand-----	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
	9-80	Sand, loamy sand.	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
172:												
Wabash----------	0-31	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	50-75	30-50
	31-60	Silty clay, clay.	CH	A-7	0	0	100	100	100	95-100	52-78	30-55
173:												
Hoopeston-------	0-13	Sandy loam-----	SM, SC-SM, SC	A-2, A-4	0	0	90-100	90-100	70-90	25-45	0-25	NP-10
	13-30	Sandy loam, fine sandy loam.	SM, SC, SC-SM	A-2, A-4	0	0	90-100	90-100	60-85	25-50	0-30	NP-10
	30-80	Loamy sand, sand, fine sand.	SP-SM, SM, SC, SC-SM	A-2, A-3	0	0	90-100	90-100	50-80	5-20	0-25	NP-10
179D2:												
Gara------------	0-7	Clay loam------	CL	A-6, A-7	0	0	90-95	85-95	70-85	55-75	35-45	15-25
	7-47	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25
	47-60	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25

Table 20.--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	
179E2:												
Gara	0-6	Clay loam	CL	A-6, A-7	0	0	90-95	85-95	70-85	55-75	35-45	15-25
	6-46	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25
	46-60	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25
197:												
Reedscreek	0-6	Loam	GM, GC, SC, CL-ML	A-1-b, A-2-4, A-4	0-5	0-5	50-95	45-65	35-65	15-65	0-30	NP-10
	6-32	Stratified extremely gravelly loam to cobbly loam.	GM, GC, SM, SC	A-2-4, A-4	5-20	25-60	80-95	80-90	50-70	25-40	0-30	NP-10
	32-47	Extremely cobbly sandy loam, very cobbly sandy loam, very cobbly loamy sand.	GM, GC, SM, SC	A-2-4, A-4	5-30	25-60	80-95	80-90	50-70	25-40	0-30	NP-10
	47-66	Extremely gravelly sandy loam, extremely gravelly loamy sand.	SM, SC, SC-SM, SP-SM	A-2-4, A-1-b	5-20	25-50	85-90	80-90	24-40	5-20	0-30	NP-10
	66-76	Unweathered bedrock.	---	---	0	0	0	0	0	0	0-14	NP
208:												
Klum	0-7	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	100	95-100	70-90	40-55	20-35	3-10
	7-44	Stratified silt loam to sandy loam.	CL-ML, SP-SM, SC-SM	A-4, A-2	0	0	100	95-100	70-95	10-70	15-30	NP-10
	44-80	Stratified loamy sand to sand.	SP-SM, SP-SM	A-4, A-2, A-1	0	0-5	90-95	85-95	30-75	3-50	15-30	NP-10
211:												
Edina	0-13	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	13-19	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	19-43	Silty clay, clay.	CH	A-7	0	0	100	100	95-100	90-100	55-75	30-45
	43-60	Silty clay loam	CL, CH	A-6, A-7	0	0	100	100	95-100	90-100	35-60	15-35

Table 20.--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	
220:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
222C2:												
Clarinda--------	0-12	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	85-100	40-50	20-30
	12-47	Silty clay, clay.	CH	A-7	0	0	100	95-100	85-100	80-100	55-70	30-40
	47-80	Clay, silty clay.	CH	A-7	0	0	95-100	95-100	80-95	75-90	55-70	35-45
223C2:												
Rinda-----------	0-6	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	85-100	40-50	20-30
	6-10	Silty clay loam	CH	A-7	0	0	100	95-100	90-100	85-100	45-55	20-30
	10-60	Clay, silty clay.	CH, CL	A-7	0	0	95-100	95-100	80-95	75-90	55-70	35-45
231:												
Edina-----------	0-13	Silt loam------	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	13-19	Silt loam------	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	19-43	Silty clay, clay.	CH	A-7	0	0	100	100	95-100	90-100	55-75	30-45
	43-60	Silty clay loam	CL, CH	A-6, A-7	0	0	100	100	95-100	90-100	35-60	15-35
260:												
Beckwith--------	0-5	Silt loam------	CL, ML, CL-ML	A-4	0	0	100	100	100	95-100	25-35	5-10
	5-14	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	5-15
	14-54	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	54-60	Silty clay loam	CH	A-7	0	0	100	100	100	95-100	50-65	25-35
261:												
Appanoose-------	0-15	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	5-15
	15-40	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	40-60	Silty clay loam	CH	A-7	0	0	100	100	100	95-100	50-65	25-35
263:												
Okaw------------	0-14	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	14-46	Silty clay, clay, silty clay loam.	CH	A-7	0	0	100	95-100	95-100	85-100	50-70	30-50
	46-58	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-40
	58-80	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-35

Table 20.--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	
273B:												
Olmitz----------	0-9	Loam-----------	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	9-32	Loam, clay loam	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	32-80	Clay loam------	CL	A-6, A-7	0	0	100	90-100	85-95	60-80	35-45	15-25
273C:												
Olmitz----------	0-9	Loam-----------	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	9-32	Loam, clay loam	CL	A-6	0	0	100	90-100	85-95	60-80	30-40	11-20
	32-80	Clay loam------	CL	A-6, A-7	0	0	100	90-100	85-95	60-80	35-45	15-25
312B:												
Seymour---------	0-8	Silt loam------	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	10-20
	8-35	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	35-60	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	40-55	20-30
312B2:												
Seymour---------	0-10	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-25
	10-30	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	30-60	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	40-55	20-30
313D2:												
Gosport---------	0-6	Silty clay loam	ML, MH	A-7	0	0	100	90-100	90-100	85-100	41-55	11-20
	6-27	Clay, silty clay, silty clay loam.	CH	A-7	0	0	100	90-100	90-100	85-100	50-65	35-50
	27-80	Weathered bedrock.	---	---	0	0	0	0	0	0	---	NP
313E2:												
Gosport---------	0-5	Silty clay loam	ML, MH	A-7	0	0	100	90-100	90-100	85-100	41-55	11-20
	5-25	Clay, silty clay, silty clay loam.	CH	A-7	0	0	100	90-100	90-100	85-100	50-65	35-50
	25-80	Weathered bedrock.			0	0	0	0	0	0	---	NP
313F2:												
Gosport---------	0-5	Silty clay loam	ML, MH	A-7	0	0	100	90-100	90-100	85-100	41-55	11-20
	5-23	Clay, silty clay, silty clay loam.	CH	A-7	0	0	100	90-100	90-100	85-100	50-65	35-50
	23-80	Weathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 20.--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	
313G:												
Gosport---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	90-100	90-100	70-100	25-40	5-15
	7-22	Clay, silty clay, silty clay loam.	CH	A-7	0	0	100	90-100	90-100	85-100	50-65	35-50
	22-80	Weathered bedrock.	---	---	0	0	0	0	0	0	---	NP
315:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
Klum-----------	0-7	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	100	95-100	70-90	40-55	20-35	3-10
	7-44	Stratified silt loam to sandy loam.	CL-ML, SP-SM, SC-SM	A-4, A-2	0	0	100	95-100	70-95	10-70	15-30	NP-10
	44-80	Stratified loamy sand to sand.	SP-SM, SP-SM	A-4, A-2, A-1	0	0-5	90-95	85-95	30-75	3-50	15-30	NP-10
Perks-----------	0-9	Loamy sand-----	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
	9-80	Sand, loamy sand.	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
362:												
Haig-----------	0-12	Silt loam------	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	12-16	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	16-46	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	50-65	30-40
	46-60	Silty clay loam	CL, CH	A-7, A-6	0	0	100	100	100	95-100	35-55	20-30
363:												
Haig-----------	0-12	Silty clay loam	CL, CH, ML, MH	A-7	0	0	100	100	100	95-100	40-55	15-25
	12-16	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	16-46	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	50-65	30-40
	46-60	Silty clay loam	CL, CH	A-7, A-6	0	0	100	100	100	95-100	35-55	20-30

Table 20.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
364B:												
Grundy----------	0-16	Silt loam------	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-20
	16-20	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	95-100	90-100	45-55	25-35
	20-40	Silty clay-----	CH	A-7	0	0	100	100	95-100	90-100	50-70	30-45
	40-60	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	90-100	40-55	25-35
364B2:												
Grundy----------	0-8	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	90-100	40-55	20-35
	8-15	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	95-100	90-100	45-55	25-35
	15-35	Silty clay-----	CH	A-7	0	0	100	100	95-100	90-100	50-70	30-45
	35-60	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	90-100	40-55	25-35
423D2:												
Bucknell--------	0-5	Silty clay loam	CL	A-6, A-7	0	0	95-100	95-100	80-95	70-95	35-45	15-25
	5-45	Clay, clay loam	CH	A-7	0	0	95-100	95-100	90-100	85-100	50-60	25-35
	45-60	Clay loam------	CL	A-6, A-7	0	0	95-100	95-100	70-90	55-85	35-50	15-30
424D2:												
Lindley---------	0-7	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	7-43	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	43-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
Keswick---------	0-4	Loam-----------	CL, CL-ML	A-6, A-4	0	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	4-31	Clay loam, clay	CH, CL	A-7	0	0-5	90-100	80-100	70-90	55-80	40-70	20-40
	31-80	Clay loam------	CL	A-6	0	0-5	90-100	80-100	70-90	55-80	30-40	15-25
424E2:												
Lindley---------	0-6	Loam-----------	CL	A-6	0	0	95-100	90-100	85-95	50-65	25-35	10-15
	6-42	Clay loam, loam	CL	A-6, A-7	0	0	95-100	90-100	85-95	55-75	30-45	12-20
	42-60	Loam, clay loam	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
Keswick---------	0-4	Loam-----------	CL, CL-ML	A-6, A-4	0	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	4-29	Clay loam, clay	CH, CL	A-7	0	0-5	90-100	80-100	70-90	55-80	40-70	20-40
	29-80	Clay loam------	CL	A-6	0	0-5	90-100	80-100	70-90	55-80	30-40	15-25
425D:												
Keswick---------	0-17	Loam-----------	CL, CL-ML	A-6, A-4	0	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	17-38	Clay loam, clay	CH, CL	A-7	0	0-5	90-100	80-100	70-90	55-80	40-70	20-40
	38-80	Clay loam------	CL	A-6	0	0-5	90-100	80-100	70-90	55-80	30-40	15-25

Table 20.--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	
425D2:												
Keswick---------	0-4	Loam-----------	CL, CL-ML	A-6, A-4	0	0-5	90-100	80-100	75-90	60-80	20-30	5-15
	4-31	Clay loam, clay	CH, CL	A-7	0	0-5	90-100	80-100	70-90	55-80	40-70	20-40
	31-80	Clay loam------	CL	A-6	0	0-5	90-100	80-100	70-90	55-80	30-40	15-25
432C2:												
Gorin-----------	0-5	Silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	5-10	Silty clay loam, silty clay.	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-30
	10-32	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	32-54	Silty clay loam, clay loam.	CL	A-6, A-7	0	0	100	100	80-95	70-90	30-50	12-30
	54-80	Clay, clay loam	CH, CL	A-7	0	0	95-100	95-100	90-100	70-95	45-70	30-45
432D:												
Gorin-----------	0-9	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	9-14	Silty clay loam, silty clay.	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-30
	14-37	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	37-59	Silty clay loam, clay loam.	CL	A-6, A-7	0	0	100	100	80-95	70-90	30-50	12-30
	59-80	Clay, clay loam	CH, CL	A-7	0	0	95-100	95-100	90-100	70-95	45-70	30-45
432D2:												
Gorin-----------	0-5	Silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-18
	5-10	Silty clay loam, silty clay.	CL	A-6, A-7	0	0	100	100	95-100	90-100	35-50	15-30
	10-30	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	90-100	50-65	30-40
	30-52	Silty clay loam, clay loam.	CL	A-6, A-7	0	0	100	100	80-95	70-90	30-50	12-30
	52-80	Clay, clay loam	CH, CL	A-7	0	0	95-100	95-100	90-100	70-95	45-70	30-45

Table 20.--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	
453:												
Tuskeego--------	0-9	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	95-100	25-35	5-15
	9-20	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	95-100	30-35	11-15
	20-45	Silty clay loam, silty clay.	CH	A-7	0	0	100	100	95-100	95-100	50-60	25-35
	45-60	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-55	25-35
460:												
Mt. Sterling----	0-7	Silt loam------	CL-ML	A-4, A-6, A-7	0	0	100	100	95-100	85-100	25-50	8-20
	7-26	Silty clay loam	CL, ML	A-4, A-6, A-7	0	0	100	100	95-100	85-100	30-50	10-20
	26-54	Silt loam, silty clay loam.	CH	A-7	0	0	100	100	95-100	85-100	60-85	35-55
	54-80	Silty clay loam, silt loam.	CH	A-7	0	0	100	100	95-100	85-100	40-65	20-35
520:												
Coppock---------	0-9	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	9-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-59	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	0	100	100	98-100	95-100	35-55	15-25
	59-80	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	95-100	40-60	15-30
520B:												
Coppock---------	0-9	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	9-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-59	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	0	100	100	98-100	95-100	35-55	15-25
	59-80	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	95-100	40-60	15-30
531B:												
Kniffin---------	0-13	Silt loam------	CL, ML	A-6, A-7	0	0	100	100	98-100	95-100	35-45	10-20
	13-30	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	30-60	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30
531B2:												
Kniffin---------	0-10	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	20-30
	10-15	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	15-60	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30

Table 20.--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	
531C2:												
Kniffin---------	0-10	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	20-30
	10-15	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	15-60	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30
532B:												
Rathbun---------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-32	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	32-80	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30
532C:												
Rathbun---------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-30	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	30-80	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30
532C2:												
Rathbun---------	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	10-28	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	28-80	Silty clay loam	CH, CL	A-7	0	0	100	100	100	95-100	45-55	20-30
534:												
Carlow----------	0-13	Silty clay-----	CL, CH	A-7	0	0	100	100	95-100	95-100	40-65	25-40
	13-60	Silty clay, clay.	CL, CH	A-7	0	0	100	100	95-100	95-100	45-75	30-50
592D2:												
Mystic----------	0-7	Clay loam------	CL	A-6, A-7	0	0	100	100	80-100	65-90	30-45	10-25
	7-80	Clay loam, clay, silty clay.	CL, CH	A-7	0	0	100	90-100	80-100	65-80	40-55	25-35
594D2:												
Galland---------	0-9	Loam-----------	CL	A-6	0	0	90-100	80-100	75-100	65-90	30-40	10-20
	9-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	0-5	90-100	80-100	75-100	65-80	40-55	25-35
598G:												
Bucklick--------	0-10	Silt loam------	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	80-95	25-40	5-15
	10-46	Silty clay loam, silty clay, clay loam.	CL	A-7	0	0	95-100	85-100	80-100	65-95	40-50	20-30
	46-56	Unweathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 20.--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	
599G:												
Nordness--------	0-2	Silt loam------	CL, CL-ML	A-4	0	0	100	100	90-100	70-90	20-30	5-10
	2-5	Silt loam, silty clay loam, loam	CL	A-6, A-7	0	0	100	100	90-100	70-90	30-45	15-25
	5-11	Silty clay loam, clay loam, loam	CL	A-7, A-6	0	2-10	85-95	80-90	70-85	65-85	30-45	15-25
	11-21	Unweathered bedrock, weathered bedrock.	---	---	0	0	0	0	0	0	---	NP
Gosport---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	90-100	90-100	70-100	25-40	5-15
	7-22	Clay, silty clay, silty clay loam.	CH	A-7	0	0	100	90-100	90-100	85-100	50-65	35-50
	22-80	Weathered bedrock.	---	---	0	0	0	0	0	0	---	NP
632B:												
Adco------------	0-8	Silt loam------	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	13-25
	8-14	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	13-25
	14-18	Silty clay, clay.	CH	A-7	0	0	100	100	100	95-100	66-76	41-49
	18-33	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	90-100	43-66	22-41
	33-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	0	100	100	95-100	75-100	31-51	13-29
699G:												
Nordness--------	0-2	Silt loam------	CL, CL-ML	A-4	0	0	100	100	90-100	70-90	20-30	5-10
	2-5	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	0	100	100	90-100	70-90	30-45	15-25
	5-11	Silty clay loam, clay loam, loam.	CL	A-7, A-6	0	2-10	85-95	80-90	70-85	65-85	30-45	15-25
	11-21	Unweathered bedrock, weathered bedrock.	---	---	0	0	0	0	0	0	---	NP

Table 20.--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	
699G:												
Bentonsport-----	0-18	Extremely gravelly loam, very gravelly loam.	CL, CL-ML	A-4, A-6	0-5	20-50	40-60	35-55	30-50	20-50	25-35	5-15
	18-32	Very cobbly loam.	GC, SC, CL	A-6, A-7-6	5-10	25-60	55-80	45-70	45-65	45-60	35-45	15-25
	32-48	Extremely cobbly loam, extremely gravelly loam.	GC, SC, CH	A-7-6	5-30	25-60	50-75	45-65	45-65	45-60	35-45	35-50
	48-70	Very cobbly loam.	CH	A-7-6	5-10	25-60	65-80	45-90	40-85	30-60	35-45	35-50
	70-75	Gravelly silt loam.	SW, SP, SP-SM	A-1	0-10	25-60	60-85	55-85	50-80	40-55	0-14	35-50
	75-99	Weathered bedrock.	---	---	0	0	0	0	0	0	---	NP
719B:												
Creal-----------	0-9	Silt loam------	ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	30-40	5-15
	9-30	Silt loam------	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	85-100	25-35	4-12
	30-63	Silty clay loam, silt loam.	CL, ML	A-6, A-7	0	0	100	100	95-100	90-100	35-50	10-25
	63-80	Silty clay loam, silt loam.	ML, CL	A-4, A-6	0	0	100	100	90-100	80-100	30-40	7-15
720:												
Racoon----------	0-9	Silt loam------	CL	A-4, A-6	0	0	100	100	95-100	90-100	20-40	8-20
	9-30	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-40	5-20
	30-63	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	35-50	15-30
	63-80	Stratified loamy fine sand to silty clay.	SM, ML, CL, SC	A-4, A-6, A-7	0	0	100	90-100	55-100	45-90	25-45	3-20
729:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15

Table 20.--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	
729:												
Coppock---------	0-9	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	9-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-59	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	0	100	100	98-100	95-100	35-55	15-25
	59-80	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	95-100	40-60	15-30
730B:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
Coppock---------	0-9	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	9-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-59	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	0	100	100	98-100	95-100	35-55	15-25
	59-80	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	95-100	40-60	15-30
Cantril---------	0-21	Loam-----------	CL	A-6	0	0	100	100	85-95	65-75	30-40	11-20
	21-80	Clay loam------	CL	A-6, A-7	0	0	100	100	90-100	70-88	35-45	15-25
792D2:												
Armstrong-------	0-8	Clay loam------	CL	A-6, A-7	0	0-5	90-100	80-95	75-90	55-80	35-45	15-25
	8-69	Clay loam, clay, silty clay loam.	CL, CH, ML, MH	A-7	0	0-5	90-100	80-95	70-90	55-80	45-70	20-35
	69-80	Clay loam------	CL	A-6	0	0-5	90-100	80-95	70-90	55-80	30-40	15-20
795C2:												
Ashgrove--------	0-5	Silty clay loam	CL	A-6, A-7	0	0	100	95-100	90-100	85-100	35-45	15-25
	5-14	Silty clay, silty clay loam.	CH	A-7	0	0	100	95-100	85-100	85-100	55-70	30-40
	14-66	Clay, silty clay.	CH	A-7	0	0	95-100	95-100	75-90	75-90	50-60	25-35
	66-80	Clay loam------	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
795D:												
Ashgrove--------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	95-100	90-100	85-100	35-45	15-25
	8-17	Silty clay, silty clay loam.	CH	A-7	0	0	100	95-100	85-100	85-100	55-70	30-40
	17-67	Clay, silty clay.	CH	A-7	0	0	95-100	95-100	75-90	75-90	50-60	25-35
	67-80	Clay loam------	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15

Table 20.--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	
795D2:												
Ashgrove--------	0-5	Silty clay loam	CL	A-6, A-7	0	0	100	95-100	90-100	85-100	35-45	15-25
	5-14	Silty clay, silty clay loam.	CH	A-7	0	0	100	95-100	85-100	85-100	55-70	30-40
	14-62	Clay, silty clay.	CH	A-7	0	0	95-100	95-100	75-90	75-90	50-60	25-35
	62-80	Clay loam------	CL	A-6	0	0	95-100	90-100	85-95	50-70	25-35	10-15
831B:												
Pershing--------	0-15	Silt loam------	CL	A-6	0	0	100	100	100	95-100	30-40	10-20
	15-17	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	17-49	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	49-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
831C2:												
Pershing--------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	6-11	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	15-30
	11-42	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	40-65	20-40
	42-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	35-55	20-35
832B:												
Weller----------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-47	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	47-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30
832C:												
Weller----------	0-12	Silt loam------	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	12-45	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	45-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30

Table 20.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
832C2:												
Weller----------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	6-43	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	43-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30
832D2:												
Weller----------	0-6	Silty clay loam	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	6-41	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	100	95-100	45-65	30-40
	41-60	Silty clay loam, silt loam.	CH, CL	A-7, A-6	0	0	100	100	100	95-100	30-55	10-30
880B:												
Clinton---------	0-9	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	9-34	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	34-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
880C:												
Clinton---------	0-8	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	8-33	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	33-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	60-80	Loam, clay loam	CL	A-6, A-7	0	0	90-100	85-100	60-80	50-75	35-45	15-25
880C2:												
Clinton---------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	8-28	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	28-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	60-80	Loam, clay loam	CL	A-6, A-7	0	0	90-100	85-100	60-80	50-75	35-45	15-25

Table 20.--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	
880D:												
Clinton----------	0-8	Silt loam------	ML	A-4	0	0	100	100	100	95-100	30-40	5-10
	8-32	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	32-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	60-80	Loam, clay loam	CL	A-6, A-7	0	0	90-100	85-100	60-80	50-75	35-45	15-25
880D2:												
Clinton----------	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	7-27	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	100	95-100	40-55	25-35
	27-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	60-80	Loam, clay loam	CL	A-6, A-7	0	0	90-100	85-100	60-80	50-75	35-45	15-25
977:												
Richwood--------	0-16	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	90-100	85-95	25-35	8-13
	16-54	Silt loam, silty clay loam.	CL	A-4, A-6	0	0	100	100	90-100	85-95	25-40	7-20
	54-88	Stratified silt loam to loamy sand.	CL, SC, SC-SM, CL-ML	A-4, A-6	0	0	100	100	85-95	35-75	20-30	4-11
993D2:												
Gara------------	0-7	Clay loam------	CL	A-6, A-7	0	0	90-95	85-95	70-85	55-75	35-45	15-25
	7-47	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25
	47-60	Clay loam, loam	CL	A-6	0	0-5	90-95	85-95	70-85	55-75	30-40	15-25
Armstrong-------	0-8	Clay loam------	CL	A-6, A-7	0	0-5	90-100	80-95	75-90	55-80	35-45	15-25
	8-69	Clay loam, clay, silty clay loam.	CL, CH, ML, MH	A-7	0	0-5	90-100	80-95	70-90	55-80	45-70	20-35
	69-80	Clay loam------	CL	A-6	0	0-5	90-100	80-95	70-90	55-80	30-40	15-20
994D2:												
Galland---------	0-9	Loam-----------	CL	A-6	0	0	90-100	80-100	75-100	65-90	30-40	10-20
	9-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	0-5	90-100	80-100	75-100	65-80	40-55	25-35

Table 20.--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	
994D2:												
Douds-----------	0-5	Loam-----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	5-51	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	51-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
994E2:												
Galland---------	0-9	Loam-----------	CL	A-6	0	0	90-100	80-100	75-100	65-90	30-40	10-20
	9-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	0-5	90-100	80-100	75-100	65-80	40-55	25-35
Douds-----------	0-4	Loam-----------	CL	A-6	0	0	95-100	85-100	70-90	60-80	25-35	10-20
	4-49	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	0	90-100	85-100	70-80	35-60	30-45	15-25
	49-80	Stratified loamy sand to clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	0	90-100	85-100	65-85	20-60	15-35	5-15
1130:												
Belinda---------	0-9	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	5-15
	9-17	Silt loam------	CL-ML, CL, ML	A-4	0	0	100	100	100	95-100	25-35	5-10
	17-39	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	100	95-100	40-55	20-30
	39-60	Silty clay loam	CH	A-7	0	0	100	100	100	95-100	50-65	25-35
1260:												
Beckwith--------	0-5	Silt loam------	CL, ML, CL-ML	A-4	0	0	100	100	100	95-100	25-35	5-10
	5-14	Silt loam------	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	5-15
	14-54	Silty clay-----	CH	A-7	0	0	100	100	100	95-100	55-70	30-40
	54-60	Silty clay loam	CH	A-7	0	0	100	100	100	95-100	50-65	25-35
1715:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
Vesser----------	0-12	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	12-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25

Table 20.--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	
1715:												
Mt. Sterling----	0-7	Silt loam------	CL-ML	A-4, A-6, A-7	0	0	100	100	95-100	85-100	25-50	8-20
	7-26	Silty clay loam	CL, ML	A-4, A-6, A-7	0	0	100	100	95-100	85-100	30-50	10-20
	26-54	Silt loam, silty clay loam.	CH	A-7	0	0	100	100	95-100	85-100	60-85	35-55
	54-80	Silty clay loam, silt loam.	CH	A-7	0	0	100	100	95-100	85-100	40-65	20-35
1977:												
Keosauqua-------	0-22	Loam-----------	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	70-90	50-70	20-35	5-15
	22-50	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	70-90	50-70	20-35	5-15
	50-80	Loam, sandy loam, loamy sand.	CL-ML, SC, CL, SC-SM	A-4	0	0	95-100	90-100	70-90	40-60	20-30	5-10
3051:												
Vesser----------	0-12	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	12-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-80	Silty clay loam	CL	A-7	0	0	100	100	98-100	95-100	40-50	15-25
3054:												
Zook------------	0-19	Silty clay loam	CH, CL	A-7	0	0	100	100	95-100	95-100	45-65	20-35
	19-37	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	95-100	95-100	60-85	35-55
	37-80	Silty clay loam, silty clay, silt loam.	CH, CL, ML, MH	A-7, A-6	0	0	100	100	95-100	95-100	35-80	10-50
3133:												
Colo------------	0-20	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-60	15-30
	20-63	Silty clay loam	CL, CH	A-7	0	0	100	100	90-100	90-100	40-55	20-30
	63-80	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	0	100	100	95-100	80-100	40-55	15-30
3139:												
Perks-----------	0-9	Loamy sand-----	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
	9-80	Sand, loamy sand.	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP

Table 20.--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	
3208:												
Klum------------	0-7	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	100	95-100	70-90	40-55	20-35	3-10
	7-44	Stratified silt loam to sandy loam.	CL-ML, SP-SM, SC-SM	A-4, A-2	0	0	100	95-100	70-95	10-70	15-30	NP-10
	44-80	Stratified loamy sand to sand.	SP-SM, SP-SM	A-4, A-2, A-1	0	0-5	90-95	85-95	30-75	3-50	15-30	NP-10
3220:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
3315:												
Nodaway---------	0-7	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-35	5-15
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	95-100	90-100	25-40	5-15
Klum------------	0-7	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	100	95-100	70-90	40-55	20-35	3-10
	7-44	Stratified silt loam to sandy loam.	CL-ML, SP-SM, SC-SM	A-4, A-2	0	0	100	95-100	70-95	10-70	15-30	NP-10
	44-80	Stratified loamy sand to sand.	SP-SM, SP-SM	A-4, A-2, A-1	0	0-5	90-95	85-95	30-75	3-50	15-30	NP-10
Perks-----------	0-9	Loamy sand-----	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
	9-80	Sand, loamy sand.	SM, SP, SP-SM	A-1	0	0	90-100	90-95	30-50	3-20	0-14	NP
3484:												
Lawson----------	0-8	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	20-40	5-20
	8-44	Silt loam, silty clay loam.	CL, CL-ML	A-4	0	0	100	100	90-100	85-100	20-30	5-10
	44-80	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	90-100	60-100	20-45	10-25

Table 20.--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	
3520:												
Coppock----------	0-9	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	9-25	Silt loam------	CL	A-6	0	0	100	100	98-100	95-100	30-40	10-20
	25-59	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	0	100	100	98-100	95-100	35-55	15-25
	59-80	Silty clay loam	CL, CH	A-7	0	0	100	100	98-100	95-100	40-60	15-30
3587:												
Chequest---------	0-11	Silty clay loam	CL	A-7	0	0	100	100	95-100	95-100	40-50	15-25
	11-80	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	95-100	90-100	45-60	20-30
3720:												
Racoon-----------	0-9	Silt loam------	CL	A-4, A-6	0	0	100	100	95-100	90-100	20-40	8-20
	9-30	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-40	5-20
	30-63	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	35-50	15-30
	63-80	Stratified loamy fine sand to silty clay.	SM, ML, CL, SC	A-4, A-6, A-7	0	0	100	90-100	55-100	45-90	25-45	3-20
5010:												
Pits, sand and gravel.												
5020:												
Pits and Dumps--	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
5030:												
Pits, limestone quarries-------	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
5040:												
Orthents---------	0-60	Loam-----------	---	---	0	0	0	0	0	0	---	NP-15
	60-80	Variable-------	---	---	0	0	0	0	0	0	---	NP
5047:												
Aquents----------	0-40	Variable-------	---	---	---	---	---	---	---	---	---	---

Table 21.--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	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
13B:												
Olmitz----------	0-9	24-27	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	3.0-4.0	0.24	0.24	5	6	48
	9-32	24-30	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	2.0-3.0	0.28	0.28			
	32-80	27-34	1.45-1.55	0.60-2.00	0.15-0.17	Moderate	1.0-2.0	0.28	0.28			
Vesser----------	0-12	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.28	0.28	5	6	48
	12-25	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	25-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
Zook------------	0-19	35-40	1.30-1.35	0.20-0.60	0.21-0.23	High-----	5.0-7.0	0.37	0.37	5	7	38
	19-37	36-45	1.30-1.45	0.06-0.20	0.11-0.13	High-----	3.0-4.0	0.28	0.28			
	37-80	20-45	1.30-1.45	0.06-0.60	0.11-0.22	High-----	0.0-1.0	0.28	0.28			
23C2:												
Arispe----------	0-9	28-38	1.35-1.40	0.60-2.00	0.21-0.23	High-----	2.0-3.0	0.37	0.37	3	7	38
	9-23	38-42	1.35-1.45	0.20-0.60	0.18-0.20	High-----	0.5-1.0	0.43	0.43			
	23-50	30-38	1.35-1.45	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	50-65	24-35	1.40-1.50	0.60-2.00	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	65-80	40-60	1.45-1.60	0.20-0.60	0.14-0.16	High-----	---	0.37	0.37			
51:												
Vesser----------	0-12	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.28	0.28	5	6	48
	12-25	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	25-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
51+:												
Vesser----------	0-22	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.28	0.28	5	6	48
	22-35	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	35-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
51B:												
Vesser----------	0-12	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.28	0.28	5	6	48
	12-25	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	25-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
54:												
Zook------------	0-19	35-40	1.30-1.35	0.20-0.60	0.21-0.23	High-----	5.0-7.0	0.37	0.37	5	7	38
	19-37	36-45	1.30-1.45	0.06-0.20	0.11-0.13	High-----	2.0-4.0	0.28	0.28			
	37-80	20-45	1.30-1.45	0.06-0.60	0.11-0.22	High-----	0.0-1.0	0.28	0.28			
58D:												
Douds-----------	0-10	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	2.0-3.0	0.28	0.28	5	6	48
	10-54	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	54-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
58D2:												
Douds-----------	0-5	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	1.0-2.0	0.32	0.32	5	6	48
	5-51	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	51-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
58E2:												
Douds-----------	0-4	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	1.0-2.0	0.32	0.32	5	6	48
	4-49	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	49-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
58F2:												
Douds----------	0-4	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	1.0-2.0	0.32	0.32	5	6	48
	4-47	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	47-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
58G:												
Douds----------	0-10	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	2.0-3.0	0.28	0.28	5	6	48
	10-45	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	45-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
65D:												
Lindley---------	0-8	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.5	0.32	0.32	5	6	48
	8-52	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	52-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
65D2:												
Lindley---------	0-7	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.0	0.32	0.32	5	6	48
	7-43	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	43-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
65E:												
Lindley---------	0-8	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.5	0.32	0.32	5	6	48
	8-50	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	50-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
65E2:												
Lindley---------	0-6	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.0	0.32	0.32	5	6	48
	6-42	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	42-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
65F2:												
Lindley---------	0-5	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.0	0.32	0.32	5	6	48
	5-41	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	41-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
65G:												
Lindley---------	0-8	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.5	0.32	0.32	5	6	48
	8-48	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	48-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
80B:												
Clinton---------	0-9	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.37	0.37	5	6	48
	9-34	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-1.0	0.37	0.37			
	34-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
80C:												
Clinton---------	0-8	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.37	0.37	5	6	48
	8-33	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-1.0	0.37	0.37			
	33-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
80C2:												
Clinton---------	0-8	27-34	1.30-1.40	0.60-2.00	0.18-0.20	Moderate	1.0-2.0	0.37	0.37	5	7	38
	8-28	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	28-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
80D:												
Clinton---------	0-8	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.37	0.37	5	6	48
	8-32	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-1.0	0.37	0.37			
	32-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
80D2:												
Clinton---------	0-7	27-34	1.30-1.40	0.60-2.00	0.18-0.20	Moderate	1.0-2.0	0.37	0.37	5	7	38
	7-27	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	27-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
130:												
Belinda---------	0-9	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	9-17	18-27	1.30-1.35	0.60-2.00	0.20-0.22	Low------	0.5-1.0	0.43	0.43			
	17-39	28-52	1.30-1.45	0.00-0.06	0.12-0.14	High-----	0.5-1.0	0.32	0.32			
	39-60	28-40	1.40-1.50	0.06-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
131B:												
Pershing--------	0-15	20-27	1.30-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	15-17	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	17-49	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	49-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
131B2:												
Pershing--------	0-7	27-38	1.30-1.40	0.20-0.60	0.22-0.24	Moderate	2.0-3.0	0.37	0.37	3	7	38
	7-12	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	12-44	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	44-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
131C:												
Pershing--------	0-15	20-27	1.30-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	15-17	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	17-48	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	48-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
131C2:												
Pershing--------	0-6	27-38	1.30-1.40	0.20-0.60	0.22-0.24	Moderate	2.0-3.0	0.37	0.37	3	7	38
	6-11	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	11-42	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	42-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
132B:												
Weller----------	0-12	16-27	1.35-1.45	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	12-47	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	47-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
132C:												
Weller----------	0-12	16-27	1.35-1.45	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	12-45	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	45-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
132C2:												
Weller----------	0-6	27-36	1.35-1.45	0.20-0.60	0.22-0.24	High-----	0.5-2.0	0.37	0.37	3	7	38
	6-43	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	43-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
139:												
Perks-----------	0-9	2-10	1.50-1.55	6.00-20.00	0.07-0.09	Low------	0.5-2.0	0.17	0.17	5	2	134
	9-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low------	0.0-0.5	0.15	0.15			
139B:												
Perks-----------	0-9	2-10	1.50-1.55	6.00-20.00	0.07-0.09	Low------	0.5-2.0	0.17	0.17	5	2	134
	9-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low------	0.0-0.5	0.15	0.15			
172:												
Wabash----------	0-31	40-46	1.25-1.45	0.00-0.06	0.12-0.14	Very high	2.0-5.0	0.28	0.28	5	4	86
	31-60	40-60	1.20-1.45	0.00-0.06	0.08-0.12	Very high	1.0-2.0	0.28	0.28			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
173:												
Hoopeston-------	0-13	8-18	1.35-1.70	2.00-6.00	0.12-0.15	Low------	2.0-3.0	0.20	0.20	4	3	86
	13-30	12-18	1.45-1.70	2.00-6.00	0.12-0.17	Low------	0.2-1.0	0.28	0.28			
	30-80	2-10	1.50-1.70	6.00-20.00	0.05-0.10	Low------	0.1-0.5	0.17	0.17			
179D2:												
Gara------------	0-7	27-35	1.50-1.55	0.20-0.60	0.16-0.18	Moderate	2.0-3.0	0.32	0.32	5	6	48
	7-47	25-38	1.55-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.32	0.32			
	47-60	24-38	1.65-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.37	---			
179E2:												
Gara------------	0-6	27-35	1.50-1.55	0.20-0.60	0.16-0.18	Moderate	2.0-3.0	0.32	0.32	5	6	48
	6-46	25-38	1.55-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.32	0.32			
	46-60	24-38	1.65-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.37	---			
197:												
Reedscreek------	0-6	5-18	1.50-1.60	2.00-6.00	0.07-0.18	Low------	0.5-2.0	0.24	0.24	3	5	56
	6-32	2-18	1.50-1.60	2.00-6.00	0.07-0.18	Low------	0.0-0.5	0.17	0.24			
	32-47	2-18	1.50-1.60	2.00-6.00	0.07-0.18	Low------	0.0-0.5	0.17	0.24			
	47-66	2-18	1.50-1.60	2.00-6.00	0.07-0.18	Low------	0.0-0.5	0.17	0.24			
	66-76	---	---	0.00-0.06	---	---	---	---	---			
208:												
Klum------------	0-7	5-18	1.50-1.60	2.00-6.00	0.15-0.18	Low------	1.0-2.0	0.20	0.20	5	3	86
	7-44	5-18	1.50-1.60	2.00-6.00	0.13-0.18	Low------	0.0-0.5	0.20	0.20			
	44-80	3-18	1.50-1.60	2.00-20.00	0.02-0.15	Low------	0.0-0.5	0.17	0.17			
211:												
Edina-----------	0-13	15-27	1.35-1.45	0.60-2.00	0.22-0.24	Moderate	1.0-4.0	0.37	0.37	3	6	48
	13-19	15-27	1.35-1.45	0.60-2.00	0.20-0.22	Moderate	0.5-1.0	0.37	0.37			
	19-43	45-60	1.30-1.45	0.00-0.06	0.11-0.13	Very high	0.0-0.5	0.37	0.37			
	43-60	27-40	1.35-1.50	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.37	0.37			
220:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	1.5-2.5	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
222C2:												
Clarinda--------	0-12	27-38	1.45-1.50	0.20-0.60	0.17-0.19	Moderate	2.0-3.0	0.37	0.37	3	7	38
	12-47	40-60	1.50-1.65	0.00-0.60	0.14-0.16	High-----	0.5-1.0	0.37	0.37			
	47-80	40-60	1.50-1.65	0.00-0.06	0.14-0.16	High-----	0.0-0.5	0.37	0.37			
223C2:												
Rinda-----------	0-6	27-35	1.45-1.50	0.20-0.60	0.20-0.22	Moderate	2.0-3.0	0.43	0.43	3	7	38
	6-10	30-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	10-60	40-60	1.50-1.65	0.00-0.06	0.14-0.16	High-----	0.0-0.5	0.32	0.32			
231:												
Edina-----------	0-13	15-27	1.35-1.45	0.60-2.00	0.22-0.24	Moderate	1.0-4.0	0.37	0.37	3	6	48
	13-19	15-27	1.35-1.45	0.60-2.00	0.20-0.22	Moderate	0.5-1.0	0.37	0.37			
	19-43	45-60	1.30-1.45	0.00-0.06	0.11-0.13	Very high	0.0-0.5	0.37	0.37			
	43-60	27-40	1.35-1.50	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.37	0.37			
260:												
Beckwith--------	0-5	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	1.0-2.0	0.37	0.37	3	6	48
	5-14	18-27	1.30-1.35	0.60-2.00	0.20-0.22	Low------	0.5-1.0	0.43	0.43			
	14-54	40-52	1.30-1.45	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.43	0.43			
	54-60	28-40	1.40-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
261:												
Appanoose-------	0-15	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.32	0.32	3	6	48
	15-40	48-60	1.40-1.50	0.00-0.06	0.12-0.14	High-----	0.0-1.0	0.43	0.43			
	40-60	30-40	1.50-1.55	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in		Pct					
263:												
Okaw------------	0-14	15-27	1.20-1.40	0.60-2.00	0.22-0.24	Low------	1.0-2.5	0.43	0.43	3	6	48
	14-46	40-60	1.35-1.60	0.00-0.06	0.09-0.18	High-----	---	0.32	0.32			
	46-58	35-60	1.45-1.70	0.00-0.06	0.08-0.18	High-----	---	0.32	0.32			
	58-80	35-55	1.50-1.70	0.00-0.06	0.08-0.20	High-----	---	0.32	0.32			
273B:												
Olmitz----------	0-9	24-27	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	3.0-4.0	0.24	0.24	5	6	48
	9-32	24-30	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	2.0-3.0	0.28	0.28			
	32-80	27-34	1.45-1.55	0.60-2.00	0.15-0.17	Moderate	1.0-2.0	0.28	0.28			
273C:												
Olmitz----------	0-9	24-27	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	3.0-4.0	0.24	0.24	5	6	48
	9-32	24-30	1.40-1.45	0.60-2.00	0.19-0.21	Moderate	2.0-3.0	0.28	0.28			
	32-80	27-34	1.45-1.55	0.60-2.00	0.15-0.17	Moderate	1.0-2.0	0.28	0.28			
312B:												
Seymour---------	0-8	22-27	1.35-1.45	0.60-2.00	0.22-0.24	Low------	3.0-4.0	0.37	0.37	3	6	48
	8-35	36-55	1.40-1.45	0.00-0.06	0.12-0.18	High-----	0.5-1.0	0.28	0.28			
	35-60	35-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
312B2:												
Seymour---------	0-10	28-38	1.40-1.45	0.20-0.60	0.18-0.20	Moderate	2.0-3.0	0.37	0.37	3	7	38
	10-30	36-55	1.40-1.45	0.00-0.06	0.12-0.18	High-----	0.5-1.0	0.28	0.28			
	30-60	35-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
313D2:												
Gosport---------	0-6	27-34	1.30-1.40	0.20-0.60	0.14-0.16	Moderate	1.0-2.0	0.43	0.43	3	7	38
	6-27	36-60	1.50-1.60	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	27-80	---	---	0.00-0.06	---	---	---	---	---			
313E2:												
Gosport---------	0-5	27-34	1.30-1.40	0.20-0.60	0.14-0.16	Moderate	1.0-2.0	0.43	0.43	3	7	38
	5-25	36-60	1.50-1.60	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	25-80	---	---	0.00-0.06	---	---	---	---	---			
313F2:												
Gosport---------	0-5	27-34	1.30-1.40	0.20-0.60	0.14-0.16	Moderate	1.0-2.0	0.43	0.43	3	7	38
	5-23	36-60	1.50-1.60	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	23-80	---	---	0.00-0.06	---	---	---	---	---			
313G:												
Gosport---------	0-7	18-27	1.30-1.40	0.20-0.60	0.18-0.20	Low------	2.0-3.0	0.43	0.43	3	6	48
	7-22	36-60	1.50-1.60	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	22-80	---	---	0.00-0.06	---	---	---	---	---			
315:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	2.0-3.0	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
Klum------------	0-7	5-18	1.50-1.60	2.00-6.00	0.15-0.18	Low------	1.0-2.0	0.20	0.20	5	3	86
	7-44	5-18	1.50-1.60	2.00-6.00	0.13-0.18	Low------	0.0-0.5	0.20	0.20			
	44-80	3-18	1.50-1.60	2.00-20.00	0.02-0.15	Low------	0.0-0.5	0.17	0.17			
Perks-----------	0-9	2-10	1.50-1.55	6.00-20.00	0.07-0.09	Low------	0.5-2.0	0.17	0.17	5	2	134
	9-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low------	0.0-0.5	0.15	0.15			
362:												
Haig------------	0-12	22-27	1.35-1.40	0.60-2.00	0.22-0.24	Moderate	3.0-4.0	0.37	0.37	3	6	48
	12-16	28-48	1.30-1.35	0.60-2.00	0.21-0.23	High-----	1.0-2.0	0.37	0.37			
	16-46	40-50	1.30-1.45	0.00-0.20	0.12-0.14	High-----	0.0-1.0	0.32	0.32			
	46-60	28-40	1.40-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
363:												
Haig------------	0-12	32-40	1.35-1.40	0.60-2.00	0.21-0.23	High-----	3.0-4.5	0.37	0.37	3	7	38
	12-16	28-48	1.30-1.35	0.60-2.00	0.21-0.23	High-----	1.0-2.0	0.37	0.37			
	16-46	40-50	1.30-1.45	0.00-0.20	0.12-0.14	High-----	0.0-1.0	0.32	0.32			
	46-60	28-40	1.40-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
364B:												
Grundy----------	0-16	12-27	1.35-1.50	0.60-2.00	0.22-0.24	Moderate	2.0-3.5	0.37	0.37	3	6	48
	16-20	32-45	1.35-1.45	0.20-0.60	0.18-0.20	High-----	0.5-1.0	0.37	0.37			
	20-40	40-50	1.30-1.40	0.06-0.20	0.11-0.13	High-----	0.0-0.5	0.37	0.37			
	40-60	28-35	1.35-1.40	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.37	0.37			
364B2:												
Grundy----------	0-8	28-35	1.35-1.45	0.20-0.60	0.18-0.20	High-----	1.0-3.0	0.37	0.37	3	7	38
	8-15	32-45	1.35-1.45	0.20-0.60	0.18-0.20	High-----	0.5-1.0	0.37	0.37			
	15-35	40-50	1.30-1.40	0.06-0.20	0.11-0.13	High-----	0.0-0.5	0.37	0.37			
	35-60	28-35	1.35-1.40	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.37	0.37			
423D2:												
Bucknell--------	0-5	27-38	1.45-1.50	0.20-0.60	0.17-0.21	Moderate	2.0-3.0	0.37	0.37	3	7	38
	5-45	38-50	1.55-1.65	0.00-0.20	0.13-0.17	High-----	0.0-0.5	0.32	0.32			
	45-60	30-40	1.60-1.70	0.06-0.20	0.14-0.18	High-----	0.0-0.5	0.32	0.32			
424D2:												
Lindley---------	0-7	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.0	0.32	0.32	5	6	48
	7-43	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	43-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
Keswick---------	0-4	22-27	1.45-1.50	0.60-2.00	0.17-0.22	Moderate	1.0-2.0	0.37	0.37	3	6	48
	4-31	35-60	1.55-1.60	0.06-0.20	0.11-0.15	High-----	0.0-0.5	0.37	0.37			
	31-80	30-40	1.60-1.75	0.20-0.60	0.12-0.16	Moderate	0.0-0.5	0.37	0.37			
424E2:												
Lindley---------	0-6	18-27	1.20-1.40	0.60-2.00	0.16-0.18	Low------	1.0-2.0	0.32	0.32	5	6	48
	6-42	25-35	1.40-1.60	0.20-0.60	0.14-0.18	Moderate	0.1-1.0	0.32	0.32			
	42-60	18-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	0.1-0.5	0.32	0.32			
Keswick---------	0-4	22-27	1.45-1.50	0.60-2.00	0.17-0.22	Moderate	1.0-2.0	0.37	0.37	3	6	48
	4-29	35-60	1.55-1.60	0.06-0.20	0.11-0.15	High-----	0.0-0.5	0.37	0.37			
	29-80	30-40	1.60-1.75	0.20-0.60	0.12-0.16	Moderate	0.0-0.5	0.37	0.37			
425D:												
Keswick---------	0-17	22-27	1.45-1.50	0.60-2.00	0.17-0.22	Moderate	2.0-3.0	0.32	0.32	3	6	48
	17-38	35-60	1.55-1.60	0.06-0.20	0.11-0.15	High-----	0.0-0.5	0.37	0.37			
	38-80	30-40	1.60-1.75	0.20-0.60	0.12-0.16	Moderate	0.0-0.5	0.37	0.37			
425D2:												
Keswick---------	0-4	22-27	1.45-1.50	0.60-2.00	0.17-0.22	Moderate	1.0-2.0	0.37	0.37	3	6	48
	4-31	35-60	1.55-1.60	0.06-0.20	0.11-0.15	High-----	0.0-0.5	0.37	0.37			
	31-80	30-40	1.60-1.75	0.20-0.60	0.12-0.16	Moderate	0.0-0.5	0.37	0.37			
432C2:												
Gorin-----------	0-5	12-30	1.30-1.50	0.60-2.00	0.22-0.24	Moderate	0.5-2.0	0.43	0.43	4	6	48
	5-10	27-42	1.30-1.45	0.06-0.60	0.18-0.20	Moderate	0.5-1.0	0.32	0.32			
	10-32	35-60	1.30-1.40	0.06-0.20	0.11-0.16	High-----	0.5-1.0	0.32	0.32			
	32-54	27-40	1.30-1.45	0.20-0.60	0.18-0.20	Moderate	0.0-0.5	0.32	0.32			
	54-80	35-60	1.30-1.40	0.00-0.06	0.10-0.12	High-----	0.0-0.5	0.37	0.37			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
432D:												
Gorin-----------	0-9	12-30	1.30-1.50	0.60-2.00	0.22-0.24	Moderate	0.5-2.5	0.43	0.43	4	6	48
	9-14	27-42	1.30-1.45	0.06-0.60	0.18-0.20	Moderate	0.5-1.0	0.32	0.32			
	14-37	35-60	1.30-1.40	0.06-0.20	0.11-0.16	High-----	0.5-1.0	0.32	0.32			
	37-59	27-40	1.30-1.45	0.20-0.60	0.18-0.20	Moderate	0.0-0.5	0.32	0.32			
	59-80	35-60	1.30-1.40	0.00-0.06	0.10-0.12	High-----	0.0-0.5	0.37	0.37			
432D2:												
Gorin-----------	0-5	12-30	1.30-1.50	0.60-2.00	0.22-0.24	Moderate	0.5-2.0	0.43	0.43	4	6	48
	5-10	27-42	1.30-1.45	0.06-0.60	0.18-0.20	Moderate	0.5-1.0	0.32	0.32			
	10-30	35-60	1.30-1.40	0.06-0.20	0.11-0.16	High-----	0.5-1.0	0.32	0.32			
	30-52	27-40	1.30-1.45	0.20-0.60	0.18-0.20	Moderate	0.0-0.5	0.32	0.32			
	52-80	35-60	1.30-1.40	0.00-0.06	0.10-0.12	High-----	0.0-0.5	0.37	0.37			
453:												
Tuskeego--------	0-9	16-22	1.35-1.40	0.60-2.00	0.19-0.23	Moderate	2.0-3.5	0.37	0.37	5	5	56
	9-20	18-30	1.40-1.50	0.06-0.20	0.18-0.22	---	1.0-2.0	0.43	---			
	20-45	32-48	1.30-1.45	0.00-0.06	0.13-0.17	High-----	0.0-2.0	0.43	0.43			
	45-60	28-40	1.40-1.50	0.06-0.20	0.16-0.19	Moderate	0.0-1.0	0.43	0.43			
460:												
Mt. Sterling----	0-7	18-27	1.25-1.30	0.60-2.00	0.21-0.23	Moderate	1.0-3.0	0.37	0.37	5	6	48
	7-26	18-30	1.25-1.30	0.60-2.00	0.21-0.23	Moderate	0.5-1.0	0.37	0.37			
	26-54	35-44	1.30-1.45	0.06-0.20	0.11-0.13	Moderate	0.0-1.0	0.28	0.28			
	54-80	35-45	1.30-1.35	0.20-0.60	0.21-0.23	High-----	0.0-1.0	0.28	0.28			
520:												
Coppock---------	0-9	16-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.32	0.32	5	6	48
	9-25	16-27	1.30-1.40	0.60-2.00	0.18-0.22	Moderate	0.0-1.0	0.43	0.43			
	25-59	25-35	1.30-1.40	0.60-2.00	0.17-0.21	Moderate	0.0-0.5	0.43	0.43			
	59-80	24-40	1.40-1.45	0.60-2.00	0.15-0.19	Moderate	0.0-0.5	0.43	0.43			
520B:												
Coppock---------	0-9	16-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.32	0.32	5	6	48
	9-25	16-27	1.30-1.40	0.60-2.00	0.18-0.22	Moderate	0.0-1.0	0.43	0.43			
	25-59	25-35	1.30-1.40	0.60-2.00	0.17-0.21	Moderate	0.0-0.5	0.43	0.43			
	59-80	24-40	1.40-1.45	0.60-2.00	0.15-0.19	Moderate	0.0-0.5	0.43	0.43			
531B:												
Kniffin---------	0-13	22-26	1.35-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	13-30	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.5-1.0	0.43	0.43			
	30-60	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
531B2:												
Kniffin---------	0-10	28-34	1.40-1.45	0.20-0.60	0.18-0.20	Moderate	1.0-2.5	0.37	0.37	3	7	38
	10-15	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.5-1.0	0.43	0.43			
	15-60	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
531C2:												
Kniffin---------	0-10	28-34	1.40-1.45	0.20-0.60	0.18-0.20	Moderate	1.0-2.5	0.37	0.37	3	7	38
	10-15	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.5-1.0	0.43	0.43			
	15-60	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
532B:												
Rathbun---------	0-12	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.43	0.43	3	6	48
	12-32	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	32-80	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.32	0.32			
532C:												
Rathbun---------	0-12	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	1.5-2.5	0.43	0.43	3	6	48
	12-30	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	30-80	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.32	0.32			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in		Pct					
532C2:												
Rathbun---------	0-10	28-34	1.40-1.45	0.20-0.60	0.18-0.20	Moderate	0.5-1.0	0.43	0.43	3	7	38
	10-28	48-56	1.40-1.45	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	28-80	32-40	1.45-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.32	0.32			
534:												
Carlow----------	0-13	40-50	1.30-1.40	0.06-0.20	0.12-0.14	High-----	2.0-3.5	0.37	0.37	5	4	86
	13-60	45-60	1.25-1.35	0.00-0.06	0.09-0.12	High-----	0.5-1.0	0.37	0.37			
592D2:												
Mystic----------	0-7	27-35	1.40-1.45	0.60-2.00	0.22-0.24	Moderate	2.0-3.0	0.32	0.32	3	6	48
	7-80	30-48	1.55-1.65	0.06-0.20	0.15-0.19	High-----	0.0-0.5	0.37	0.37			
594D2:												
Galland---------	0-9	22-27	1.45-1.50	0.60-2.00	0.19-0.21	Moderate	1.0-2.0	0.37	0.37	3	6	48
	9-60	35-48	1.50-1.65	0.06-0.20	0.14-0.19	High-----	0.0-0.5	0.37	0.37			
598G:												
Bucklick--------	0-10	15-25	1.35-1.45	0.60-2.00	0.15-0.24	Low------	2.0-4.0	0.32	0.32	3	6	48
	10-46	35-45	1.25-1.35	0.60-2.00	0.10-0.18	High-----	0.5-1.0	0.32	0.32			
	46-56	---	---	0.01-0.06	---	---	---	---	---			
599G:												
Nordness--------	0-2	18-24	1.30-1.35	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.32	0.32	1	6	48
	2-5	22-29	1.35-1.45	0.60-2.00	0.20-0.22	Moderate	0.5-1.0	0.32	0.32			
	5-11	22-35	1.35-1.60	0.60-2.00	0.12-0.15	High-----	0.0-0.5	0.37	0.37			
	11-21	---	---	0.00-0.06	---	---	---	---	---			
Gosport---------	0-7	18-27	1.30-1.40	0.20-0.60	0.18-0.20	Low------	2.0-3.0	0.43	0.43	3	6	48
	7-22	36-60	1.50-1.60	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	22-80	---	---	0.00-0.06	---	---	---	---	---			
632B:												
Adco------------	0-8	15-30	1.20-1.40	0.60-2.00	0.20-0.24	Low------	1.0-3.0	0.32	0.32	3	6	48
	8-14	15-30	1.20-1.40	0.60-2.00	0.16-0.20	Low------	0.5-1.0	0.32	0.32			
	14-18	50-60	1.20-1.40	0.00-0.06	0.09-0.11	High-----	0.5-1.0	0.43	0.43			
	18-33	32-50	1.25-1.45	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	33-60	15-35	1.30-1.50	0.06-0.20	0.14-0.18	Moderate	0.0-0.5	0.43	0.43			
699G:												
Nordness--------	0-2	18-24	1.30-1.35	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.32	0.32	1	6	48
	2-5	22-29	1.35-1.45	0.60-2.00	0.20-0.22	Moderate	0.5-1.0	0.32	0.32			
	5-11	22-35	1.35-1.60	0.60-2.00	0.12-0.15	High-----	0.0-0.5	0.37	0.37			
	11-21	---	---	0.00-0.06	---	---	---	---	---			
Bentonsport-----	0-18	15-35	1.30-1.35	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.20	0.28	4	5	56
	18-32	18-35	1.30-1.45	0.60-2.00	0.06-0.09	Low------	1.0-2.0	0.20	0.28			
	32-48	18-35	1.50-1.60	0.60-2.00	0.05-0.08	Low------	0.0-0.5	0.20	0.28			
	48-70	18-35	1.50-1.60	0.60-2.00	0.05-0.08	Low------	0.0-0.5	0.20	0.28			
	70-75	15-27	1.30-1.40	0.60-2.00	---	Low------	0.0-0.5	0.24	0.32			
	75-99	---	---	0.00-0.06	---	---	---	---	---			
719B:												
Creal-----------	0-9	20-27	1.30-1.50	0.20-0.60	0.22-0.24	Low------	1.0-3.0	0.37	---	5	6	48
	9-30	18-25	1.35-1.60	0.20-0.60	0.18-0.20	Low------	0.0-0.5	0.37	---			
	30-63	25-35	1.35-1.60	0.20-0.60	0.18-0.20	Moderate	0.0-0.5	0.37	---			
	63-80	20-27	1.40-1.60	0.20-0.60	0.20-0.22	Low------	0.0-0.5	0.37	---			
720:												
Racoon----------	0-9	20-27	1.30-1.50	0.20-0.60	0.22-0.24	Moderate	1.0-2.0	0.37	0.37	5	6	48
	9-30	18-25	1.35-1.50	0.20-0.60	0.20-0.22	Moderate	0.2-0.5	0.37	0.37			
	30-63	27-35	1.35-1.60	0.06-0.20	0.18-0.20	High-----	0.5-1.0	0.37	0.37			
	63-80	18-30	1.40-1.65	0.20-0.60	0.09-0.17	Moderate	0.5-1.0	0.37	0.37			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
729:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	2.0-3.0	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
Coppock---------	0-9	16-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.32	0.32	5	6	48
	9-25	16-27	1.30-1.40	0.60-2.00	0.18-0.22	Moderate	0.0-1.0	0.43	0.43			
	25-59	25-35	1.30-1.40	0.60-2.00	0.17-0.21	Moderate	0.0-0.5	0.43	0.43			
	59-80	24-40	1.40-1.45	0.60-2.00	0.15-0.19	Moderate	0.0-0.5	0.43	0.43			
730B:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	1.5-2.5	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
Coppock---------	0-9	16-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.32	0.32	5	6	48
	9-25	16-27	1.30-1.40	0.60-2.00	0.18-0.22	Moderate	0.0-1.0	0.43	0.43			
	25-59	25-35	1.30-1.40	0.60-2.00	0.17-0.21	Moderate	0.0-0.5	0.43	0.43			
	59-80	24-40	1.40-1.45	0.60-2.00	0.15-0.19	Moderate	0.0-0.5	0.43	0.43			
Cantril---------	0-21	14-27	1.40-1.45	0.60-2.00	0.17-0.19	Low------	2.0-3.0	0.28	0.28	5	6	48
	21-80	27-35	1.45-1.75	0.60-2.00	0.14-0.16	Moderate	0.0-1.0	0.32	0.32			
792D2:												
Armstrong-------	0-8	35-42	1.45-1.50	0.20-0.60	0.18-0.20	Moderate	2.0-3.0	0.32	0.32	3	4	86
	8-69	36-60	1.55-1.60	0.06-0.20	0.11-0.16	High-----	0.0-1.0	0.32	0.32			
	69-80	30-36	1.55-1.70	0.20-0.60	0.14-0.16	Moderate	0.0-0.5	0.32	0.32			
795C2:												
Ashgrove--------	0-5	27-40	1.45-1.50	0.20-0.60	0.18-0.20	Moderate	1.0-2.0	0.43	0.43	3	7	38
	5-14	35-45	1.45-1.50	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	14-66	40-60	1.50-1.65	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	66-80	27-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	---	0.32	0.32			
795D:												
Ashgrove--------	0-8	27-40	1.45-1.50	0.20-0.60	0.18-0.20	Moderate	2.0-3.0	0.43	0.43	3	7	38
	8-17	35-45	1.45-1.50	0.00-0.06	0.12-0.14	High-----	0.0-1.0	0.32	0.32			
	17-67	40-60	1.50-1.65	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	67-80	27-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	---	0.32	0.32			
795D2:												
Ashgrove--------	0-5	27-40	1.45-1.50	0.20-0.60	0.18-0.20	Moderate	1.0-2.0	0.43	0.43	3	7	38
	5-14	35-45	1.45-1.50	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	14-62	40-60	1.50-1.65	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.32	0.32			
	62-80	27-32	1.45-1.65	0.20-0.60	0.12-0.16	Moderate	---	0.32	0.32			
831B:												
Pershing--------	0-15	20-27	1.30-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	15-17	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	17-49	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	49-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
831C2:												
Pershing--------	0-6	27-38	1.30-1.40	0.20-0.60	0.22-0.24	Moderate	2.0-3.0	0.37	0.37	3	7	38
	6-11	27-35	1.30-1.40	0.20-0.60	0.20-0.22	Moderate	0.0-1.0	0.43	0.43			
	11-42	35-48	1.35-1.45	0.06-0.20	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
	42-60	24-40	1.35-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
832B:												
Weller----------	0-12	16-27	1.35-1.45	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	12-47	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	47-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
832C:												
Weller----------	0-12	16-27	1.35-1.45	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	12-45	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	45-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
832C2:												
Weller----------	0-6	27-36	1.35-1.45	0.20-0.60	0.22-0.24	High-----	0.5-2.0	0.37	0.37	3	7	38
	6-43	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	43-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
832D2:												
Weller----------	0-6	27-36	1.35-1.45	0.20-0.60	0.22-0.24	High-----	0.5-2.0	0.37	0.37	3	7	38
	6-41	28-48	1.35-1.50	0.06-0.20	0.12-0.18	High-----	0.0-0.5	0.43	0.43			
	41-60	25-40	1.40-1.55	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
880B:												
Clinton---------	0-9	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	2.0-3.0	0.37	0.37	5	6	48
	9-34	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-1.0	0.37	0.37			
	34-80	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
880C:												
Clinton---------	0-8	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	1.0-2.5	0.37	0.37	5	6	48
	8-33	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	33-60	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
	60-80	17-30	1.45-1.65	0.60-2.00	0.14-0.18	Low------	0.0-0.5	0.32	0.32			
880C2:												
Clinton---------	0-8	27-34	1.30-1.40	0.60-2.00	0.18-0.20	Moderate	1.0-2.0	0.37	0.37	5	7	38
	8-28	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	28-60	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
	60-80	17-30	1.45-1.65	0.60-2.00	0.14-0.18	Low------	0.0-0.5	0.32	0.32			
880D:												
Clinton---------	0-8	16-26	1.30-1.40	0.60-2.00	0.20-0.22	Low------	1.0-2.5	0.37	0.37	5	6	48
	8-32	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	32-60	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
	60-80	17-30	1.45-1.65	0.60-2.00	0.14-0.18	Low------	0.0-0.5	0.32	0.32			
880D2:												
Clinton---------	0-7	27-34	1.30-1.40	0.60-2.00	0.18-0.20	Moderate	1.0-2.0	0.37	0.37	5	7	38
	7-27	36-42	1.35-1.45	0.20-0.60	0.16-0.20	Moderate	0.0-0.5	0.37	0.37			
	27-60	24-35	1.40-1.55	0.60-2.00	0.18-0.20	Moderate	0.0-0.5	0.37	0.37			
	60-80	17-30	1.45-1.65	0.60-2.00	0.14-0.18	Low------	0.0-0.5	0.32	0.32			
977:												
Richwood--------	0-16	15-22	1.35-1.60	0.60-2.00	0.22-0.24	Low------	2.0-5.0	0.28	0.28	4	5	56
	16-54	18-30	1.55-1.65	0.60-2.00	0.18-0.22	Moderate	0.5-1.0	0.43	0.43			
	54-88	10-20	1.55-1.65	0.60-6.00	0.09-0.22	Low------	0.0-0.5	0.43	0.43			
993D2:												
Gara------------	0-7	27-35	1.50-1.55	0.20-0.60	0.16-0.18	Moderate	2.0-3.0	0.32	0.32	5	6	48
	7-47	25-38	1.55-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.32	0.32			
	47-60	24-38	1.65-1.75	0.20-0.60	0.16-0.18	Moderate	0.0-0.5	0.37	---			
Armstrong-------	0-8	35-42	1.45-1.50	0.20-0.60	0.18-0.20	Moderate	2.0-3.0	0.32	0.32	3	4	86
	8-69	36-60	1.55-1.60	0.06-0.20	0.11-0.16	High-----	0.0-1.0	0.32	0.32			
	69-80	30-36	1.55-1.70	0.20-0.60	0.14-0.16	Moderate	0.0-0.5	0.32	0.32			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
994D2:												
Galland---------	0-9	22-27	1.45-1.50	0.60-2.00	0.19-0.21	Moderate	1.0-2.0	0.37	0.37	3	6	48
	9-60	35-48	1.50-1.65	0.06-0.20	0.14-0.19	High-----	0.0-0.5	0.37	0.37			
Douds-----------	0-5	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	1.0-2.0	0.32	0.32	5	6	48
	5-51	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	51-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
994E2:												
Galland---------	0-9	22-27	1.45-1.50	0.60-2.00	0.19-0.21	Moderate	1.0-2.0	0.37	0.37	3	6	48
	9-60	35-48	1.50-1.65	0.06-0.20	0.14-0.19	High-----	0.0-0.5	0.37	0.37			
Douds-----------	0-4	20-27	1.45-1.50	0.60-2.00	0.15-0.17	Low------	1.0-2.0	0.32	0.32	5	6	48
	4-49	26-35	1.45-1.65	0.60-2.00	0.15-0.17	Moderate	0.0-1.0	0.32	0.32			
	49-80	5-30	1.55-1.75	0.60-6.00	0.11-0.13	Low------	0.0-0.5	0.32	0.32			
1130:												
Belinda---------	0-9	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	2.0-3.0	0.37	0.37	3	6	48
	9-17	18-27	1.30-1.35	0.60-2.00	0.20-0.22	Low------	0.5-1.0	0.43	0.43			
	17-39	28-52	1.30-1.45	0.00-0.06	0.12-0.14	High-----	0.5-1.0	0.32	0.32			
	39-60	28-40	1.40-1.50	0.06-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
1260:												
Beckwith--------	0-5	16-22	1.35-1.40	0.60-2.00	0.22-0.24	Low------	1.0-2.0	0.37	0.37	3	6	48
	5-14	18-27	1.30-1.35	0.60-2.00	0.20-0.22	Low------	0.5-1.0	0.43	0.43			
	14-54	40-52	1.30-1.45	0.00-0.06	0.12-0.14	High-----	0.0-0.5	0.43	0.43			
	54-60	28-40	1.40-1.50	0.20-0.60	0.18-0.20	High-----	0.0-0.5	0.43	0.43			
1715:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	1.5-2.5	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
Vesser----------	0-12	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.28	0.28	5	6	48
	12-25	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	25-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
Mt. Sterling----	0-7	18-27	1.25-1.30	0.60-2.00	0.21-0.23	Moderate	1.0-3.0	0.37	0.37	5	6	48
	7-26	18-30	1.25-1.30	0.60-2.00	0.21-0.23	Moderate	0.5-1.0	0.37	0.37			
	26-54	35-44	1.30-1.45	0.06-0.20	0.11-0.13	Moderate	0.0-1.0	0.28	0.28			
	54-80	35-45	1.30-1.35	0.20-0.60	0.21-0.23	High-----	0.0-1.0	0.28	0.28			
1977:												
Keosauqua-------	0-22	18-26	1.35-1.45	0.60-2.00	0.20-0.22	Low------	3.0-4.0	0.24	0.24	5	5	56
	22-50	18-36	1.40-1.50	0.60-2.00	0.17-0.19	Low------	0.0-1.0	0.32	0.32			
	50-80	5-20	1.50-1.65	0.60-6.00	0.15-0.19	Low------	0.0-1.0	0.32	0.32			
3051:												
Vesser----------	0-12	20-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.5	0.28	0.28	5	6	48
	12-25	18-22	1.35-1.40	0.60-2.00	0.18-0.22	Moderate	1.0-2.0	0.43	0.43			
	25-80	30-35	1.40-1.45	0.60-2.00	0.17-0.21	Moderate	0.0-1.0	0.43	0.43			
3054:												
Zook------------	0-19	35-40	1.30-1.35	0.20-0.60	0.21-0.23	High-----	5.0-7.0	0.37	0.37	5	7	38
	19-37	36-45	1.30-1.45	0.06-0.20	0.11-0.13	High-----	2.0-4.0	0.28	0.28			
	37-80	20-45	1.30-1.45	0.06-0.60	0.11-0.22	High-----	0.0-1.0	0.28	0.28			
3133:												
Colo------------	0-20	27-36	1.28-1.32	0.60-2.00	0.21-0.23	Moderate	5.0-7.0	0.28	0.28	5	7	38
	20-63	30-35	1.25-1.35	0.60-2.00	0.18-0.20	Moderate	3.0-4.0	0.28	0.28			
	63-80	25-35	1.35-1.45	0.60-2.00	0.18-0.20	Moderate	1.0-2.0	0.32	0.32			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Organic matter	Erosion factors K	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
3139:												
Perks-----------	0-9	2-10	1.50-1.55	6.00-20.00	0.07-0.09	Low------	0.5-1.0	0.17	0.17	5	2	134
	9-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low------	0.0-0.5	0.15	0.15			
3208:												
Klum------------	0-7	5-18	1.50-1.60	2.00-6.00	0.15-0.18	Low------	1.0-2.0	0.20	0.20	5	3	86
	7-44	5-18	1.50-1.60	2.00-6.00	0.13-0.18	Low------	0.0-0.5	0.20	0.20			
	44-80	3-18	1.50-1.60	2.00-20.00	0.02-0.15	Low------	0.0-0.5	0.17	0.17			
3220:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	1.5-2.5	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
3315:												
Nodaway---------	0-7	18-27	1.25-1.35	0.60-2.00	0.20-0.23	Low------	1.5-2.5	0.32	0.32	5	6	48
	7-60	18-28	1.25-1.35	0.60-2.00	0.20-0.23	Moderate	0.0-0.5	0.43	0.43			
Klum------------	0-7	5-18	1.50-1.60	2.00-6.00	0.15-0.18	Low------	1.0-2.0	0.20	0.20	5	3	86
	7-44	5-18	1.50-1.60	2.00-6.00	0.13-0.18	Low------	0.0-0.5	0.20	0.20			
	44-80	3-18	1.50-1.60	2.00-20.00	0.02-0.15	Low------	0.0-0.5	0.17	0.17			
Perks-----------	0-9	2-10	1.50-1.55	6.00-20.00	0.07-0.09	Low------	0.5-2.0	0.17	0.17	5	2	134
	9-80	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low------	0.0-0.5	0.15	0.15			
3484:												
Lawson----------	0-8	10-27	1.20-1.55	0.60-2.00	0.22-0.24	Low------	3.0-7.0	0.28	0.28	5	5	56
	8-44	10-30	1.20-1.55	0.60-2.00	0.18-0.22	Low------	3.0-7.0	0.28	0.28			
	44-80	18-30	1.55-1.65	0.60-2.00	0.18-0.20	Moderate	1.0-4.0	0.43	0.43			
3520:												
Coppock---------	0-9	16-26	1.30-1.35	0.60-2.00	0.20-0.24	Moderate	2.0-3.0	0.32	0.32	5	6	48
	9-25	16-27	1.30-1.40	0.60-2.00	0.18-0.22	Moderate	0.0-1.0	0.43	0.43			
	25-59	25-35	1.30-1.40	0.60-2.00	0.17-0.21	Moderate	0.0-0.5	0.43	0.43			
	59-80	24-40	1.40-1.45	0.60-2.00	0.15-0.19	Moderate	0.0-0.5	0.43	0.43			
3587:												
Chequest--------	0-11	30-35	1.30-1.35	0.20-0.60	0.18-0.20	High-----	3.0-4.0	0.32	0.32	5	7	38
	11-80	35-42	1.35-1.45	0.20-0.60	0.14-0.18	High-----	0.0-1.0	0.43	0.43			
3720:												
Racoon----------	0-9	20-27	1.30-1.50	0.20-0.60	0.22-0.24	Moderate	1.0-3.0	0.37	0.37	5	6	48
	9-30	18-25	1.35-1.50	0.20-0.60	0.20-0.22	Moderate	0.2-0.5	0.37	0.37			
	30-63	27-35	1.35-1.60	0.06-0.20	0.18-0.20	High-----	0.5-1.0	0.37	0.37			
	63-80	18-30	1.40-1.65	0.20-0.60	0.09-0.17	Moderate	0.5-1.0	0.37	0.37			
5010:												
Pits, sand and gravel.												
5020:												
Pits and Dumps--	0-60	---	---	0.01-20.00	---	---	---	---	---	5	8	---
5030:												
Pits, limestone quarries-------	0-60	---	---	0.01-20.00	---	---	---	---	---	5	8	---
5040:												
Orthents--------	0-60	2-18	1.50-1.70	0.60-2.00	0.08-0.14	Low------	---	0.24	---	5	3	86
	60-80	---	---	0.06-2.00	---	---	---	---	---			

Table 21.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in		Pct					
5047:												
Aquents---------	0-40	---	---	0.60-6.00	---	---	---	---	---	5	8	---

Table 22.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
13B:						
Olmitz----------	0-9	24-27	20.0-25.0	5.6-7.3	---	---
	9-32	24-30	20.0-25.0	5.6-7.3	---	---
	32-80	27-34	20.0-25.0	5.1-6.5	---	---
Vesser----------	0-12	20-26	25.0-30.0	5.6-7.3	---	---
	12-25	18-22	20.0-25.0	5.1-6.0	---	---
	25-80	30-35	25.0-30.0	5.6-6.5	---	---
Zook------------	0-19	35-40	36.0-41.0	5.6-7.3	---	---
	19-37	36-45	36.0-41.0	5.6-7.8	0-15	---
	37-80	20-45	30.0-36.0	5.6-7.8	0-15	---
23C2:						
Arispe----------	0-9	28-38	25.0-30.0	5.6-7.3	---	---
	9-23	38-42	25.0-30.0	5.6-7.3	---	---
	23-50	30-38	25.0-30.0	6.6-7.3	---	---
	50-65	24-35	25.0-30.0	5.6-7.3	---	---
	65-80	40-60	41.0-60.0	5.1-6.5	---	---
51:						
Vesser----------	0-12	20-26	25.0-30.0	5.6-7.3	---	---
	12-25	18-22	20.0-25.0	5.1-6.0	---	---
	25-80	30-35	25.0-30.0	5.1-6.5	---	---
51+:						
Vesser----------	0-22	20-26	25.0-30.0	5.6-7.3	---	---
	22-35	18-22	20.0-25.0	5.1-6.0	---	---
	35-80	30-35	25.0-30.0	5.1-6.5	---	---
51B:						
Vesser----------	0-12	20-26	25.0-30.0	5.6-7.3	---	---
	12-25	18-22	20.0-25.0	5.1-6.0	---	---
	25-80	30-35	25.0-30.0	5.6-6.5	---	---
54:						
Zook------------	0-19	35-40	36.0-41.0	5.6-7.3	---	---
	19-37	36-45	36.0-41.0	5.6-7.4	---	---
	37-80	20-45	30.0-36.0	5.6-7.4	---	---
58D:						
Douds-----------	0-10	20-27	15.0-20.0	5.1-7.3	---	---
	10-54	26-35	15.0-20.0	4.5-6.0	---	---
	54-80	5-30	5.0-20.0	5.1-6.0	---	---
58D2:						
Douds-----------	0-5	20-27	15.0-20.0	5.1-7.3	---	---
	5-51	26-35	15.0-20.0	4.5-6.0	---	---
	51-80	5-30	5.0-20.0	5.1-6.0	---	---
58E2:						
Douds-----------	0-4	20-27	15.0-20.0	5.1-7.3	---	---
	4-49	26-35	15.0-20.0	4.5-6.0	---	---
	49-80	5-30	5.0-20.0	5.1-6.0	---	---
58F2:						
Douds-----------	0-4	20-27	15.0-20.0	5.1-7.3	---	---
	4-47	26-35	15.0-20.0	4.5-6.0	---	---
	47-80	5-30	5.0-20.0	5.1-6.0	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
58G:						
Douds-----------	0-10	20-27	15.0-20.0	5.1-7.3	---	---
	10-45	26-35	15.0-20.0	4.5-6.0	---	---
	45-80	5-30	5.0-20.0	5.1-6.0	---	---
65D:						
Lindley---------	0-8	18-27	10.0-16.0	4.5-7.3	---	---
	8-52	25-35	15.0-20.0	4.5-6.5	---	---
	52-60	18-32	10.0-16.0	6.1-7.8	---	---
65D2:						
Lindley---------	0-7	18-27	10.0-16.0	4.5-7.3	---	---
	7-43	25-35	15.0-20.0	4.5-6.5	---	---
	43-60	18-32	10.0-16.0	6.1-7.8	---	---
65E:						
Lindley---------	0-8	18-27	10.0-16.0	4.5-7.3	---	---
	8-50	25-35	15.0-20.0	4.5-6.5	---	---
	50-60	18-32	10.0-16.0	6.1-7.8	---	---
65E2:						
Lindley---------	0-6	18-27	10.0-16.0	4.5-7.3	---	---
	6-42	25-35	15.0-20.0	4.5-6.5	---	---
	42-60	18-32	10.0-16.0	6.1-7.8	---	---
65F2:						
Lindley---------	0-5	18-27	10.0-16.0	4.5-7.3	---	---
	5-41	25-35	15.0-20.0	4.5-6.5	---	---
	41-60	18-32	10.0-16.0	6.1-7.8	---	---
65G:						
Lindley---------	0-8	18-27	10.0-16.0	4.5-7.3	---	---
	8-48	25-35	15.0-20.0	4.5-6.5	---	---
	48-60	18-32	10.0-16.0	6.1-7.8	---	---
80B:						
Clinton---------	0-9	16-26	15.0-20.0	5.1-7.3	---	---
	9-34	36-42	25.0-30.0	4.5-6.0	---	---
	34-80	24-35	20.0-25.0	6.1-6.5	---	---
80C:						
Clinton---------	0-8	16-26	15.0-20.0	5.1-7.3	---	---
	8-33	36-42	25.0-30.0	4.5-6.0	---	---
	33-80	24-35	20.0-25.0	6.1-6.5	---	---
80C2:						
Clinton---------	0-8	27-34	25.0-30.0	5.1-7.3	---	---
	8-28	36-42	25.0-30.0	4.5-6.0	---	---
	28-80	24-35	20.0-25.0	6.1-6.5	---	---
80D:						
Clinton---------	0-8	16-26	15.0-20.0	5.1-7.3	---	---
	8-32	36-42	25.0-30.0	4.5-6.0	---	---
	32-80	24-35	20.0-25.0	6.1-6.5	---	---
80D2:						
Clinton---------	0-7	27-34	25.0-30.0	5.1-7.3	---	---
	7-27	36-42	25.0-30.0	4.5-6.0	---	---
	27-80	24-35	20.0-25.0	6.1-6.5	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
130:						
Belinda---------	0-9	16-22	20.0-25.0	5.6-7.3	---	---
	9-17	18-27	20.0-25.0	4.5-6.0	---	---
	17-39	28-52	30.0-36.0	4.5-6.5	---	---
	39-60	28-40	30.0-36.0	5.1-6.0	---	---
131B:						
Pershing--------	0-15	20-27	20.0-25.0	4.5-7.3	---	---
	15-17	27-35	25.0-30.0	5.1-6.0	---	---
	17-49	35-48	30.0-36.0	5.1-6.0	---	---
	49-60	24-40	25.0-30.0	5.1-6.5	---	---
131B2:						
Pershing--------	0-7	27-38	25.0-30.0	4.5-7.3	---	---
	7-12	27-35	25.0-30.0	5.1-6.0	---	---
	12-44	35-48	30.0-36.0	5.1-6.0	---	---
	44-60	24-40	25.0-30.0	5.1-6.5	---	---
131C:						
Pershing--------	0-15	20-27	20.0-25.0	4.5-7.3	---	---
	15-17	27-35	25.0-30.0	5.1-6.0	---	---
	17-48	35-48	30.0-36.0	5.1-6.0	---	---
	48-60	24-40	25.0-30.0	5.1-6.5	---	---
131C2:						
Pershing--------	0-6	27-38	25.0-30.0	4.5-7.3	---	---
	6-11	27-35	25.0-30.0	5.1-6.0	---	---
	11-42	35-48	30.0-36.0	5.1-6.0	---	---
	42-60	24-40	25.0-30.0	5.1-6.5	---	---
132B:						
Weller----------	0-12	16-27	15.0-20.0	4.5-7.3	---	---
	12-47	28-48	30.0-35.0	4.5-6.0	---	---
	47-60	25-40	25.0-30.0	5.1-6.5	---	---
132C:						
Weller----------	0-12	16-27	15.0-20.0	4.5-7.3	---	---
	12-45	28-48	30.0-35.0	4.5-6.0	---	---
	45-60	25-40	25.0-30.0	5.1-6.5	---	---
132C2:						
Weller----------	0-6	27-36	25.0-30.0	4.5-7.3	---	---
	6-43	28-48	30.0-35.0	4.5-6.0	---	---
	43-60	25-40	25.0-30.0	5.1-6.5	---	---
139:						
Perks-----------	0-9	2-10	5.0-10.0	5.6-7.3	---	---
	9-80	2-10	5.0-10.0	5.6-7.3	---	---
139B:						
Perks-----------	0-9	2-10	5.0-10.0	5.6-7.3	---	---
	9-80	2-10	5.0-10.0	5.6-7.3	---	---
172:						
Wabash----------	0-31	40-46	30.0-35.0	5.1-7.3	---	---
	31-60	40-60	28.0-42.0	5.1-7.8	---	---
173:						
Hoopeston-------	0-13	8-18	9.0-17.0	5.1-6.5	---	---
	13-30	12-18	7.0-13.0	5.1-7.8	0-5	---
	30-80	2-10	1.0-7.0	4.5-8.4	0-20	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
179D2:						
Gara------------	0-7	27-35	25.0-30.0	5.6-7.3	---	---
	7-47	25-38	25.0-30.0	4.5-6.5	---	---
	47-60	24-38	25.0-30.0	5.6-8.4	0-25	---
179E2:						
Gara------------	0-6	27-35	25.0-30.0	5.6-7.3	---	---
	6-46	25-38	25.0-30.0	4.5-6.5	---	---
	46-60	24-38	25.0-30.0	5.6-8.4	0-25	---
197:						
Reedscreek------	0-6	5-18	5.0-15.0	7.4-8.4	0-20	---
	6-32	2-18	5.0-15.0	7.4-8.4	0-20	---
	32-47	2-18	5.0-15.0	7.4-8.4	0-20	---
	47-66	2-18	5.0-15.0	7.4-8.4	0-20	---
	66-76	---	---	---	---	---
208:						
Klum------------	0-7	5-18	10.0-15.0	5.6-7.3	---	---
	7-44	5-18	10.0-15.0	5.6-7.3	---	---
	44-80	3-18	10.0-15.0	6.1-7.3	---	---
211:						
Edina-----------	0-13	15-27	14.0-20.0	5.1-7.3	---	---
	13-19	15-27	14.0-20.0	5.1-7.3	---	---
	19-43	45-60	28.0-42.0	5.1-7.3	---	---
	43-60	27-40	20.0-30.0	6.1-7.3	---	---
220:						
Nodaway---------	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
222C2:						
Clarinda--------	0-12	27-38	36.0-41.0	5.1-7.3	---	---
	12-47	40-60	41.0-50.0	5.1-6.5	---	---
	47-80	40-60	41.0-50.0	5.6-8.4	0-30	---
223C2:						
Rinda-----------	0-6	27-35	30.0-36.0	5.6-7.3	---	---
	6-10	30-40	30.0-36.0	5.1-6.5	---	---
	10-60	40-60	41.0-50.0	5.1-7.3	---	---
231:						
Edina-----------	0-13	15-27	14.0-20.0	5.1-7.3	---	---
	13-19	15-27	14.0-20.0	5.1-7.3	---	---
	19-43	45-60	28.0-42.0	5.1-7.3	---	---
	43-60	27-40	20.0-30.0	6.1-7.3	---	---
260:						
Beckwith--------	0-5	16-22	15.0-20.0	4.5-7.3	---	---
	5-14	18-27	15.0-20.0	4.5-5.5	---	---
	14-54	40-52	36.0-41.0	5.1-6.0	---	---
	54-60	28-40	30.0-36.0	5.6-6.5	---	---
261:						
Appanoose-------	0-15	16-22	20.0-25.0	4.5-7.3	---	---
	15-40	48-60	30.0-36.0	5.1-6.0	---	---
	40-60	30-40	25.0-30.0	5.6-6.5	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
263:						
Okaw	0-14	15-27	---	4.5-7.3	---	---
	14-46	40-60	---	4.5-6.0	---	---
	46-58	35-60	---	4.5-7.3	---	---
	58-80	35-55	---	3.6-8.4	---	---
273B:						
Olmitz	0-9	24-27	20.0-25.0	5.6-7.3	---	---
	9-32	24-30	20.0-25.0	5.6-7.3	---	---
	32-80	27-34	20.0-25.0	5.1-6.5	---	---
273C:						
Olmitz	0-9	24-27	20.0-25.0	5.6-7.3	---	---
	9-32	24-30	20.0-25.0	5.6-7.3	---	---
	32-80	27-34	20.0-25.0	5.1-6.5	---	---
312B:						
Seymour	0-8	22-27	25.0-30.0	5.6-7.3	---	---
	8-35	36-55	41.0-45.0	5.1-6.5	---	---
	35-60	35-40	25.0-30.0	5.6-7.3	---	---
312B2:						
Seymour	0-10	28-38	25.0-30.0	5.6-7.3	---	---
	10-30	36-55	41.0-45.0	5.1-6.5	---	---
	30-60	35-40	25.0-30.0	5.6-7.3	---	---
313D2:						
Gosport	0-6	27-34	15.0-20.0	5.1-7.3	---	---
	6-27	36-60	30.0-50.0	3.6-5.5	---	---
	27-80	---	---	---	---	---
313E2:						
Gosport	0-5	27-34	15.0-20.0	5.1-7.3	---	---
	5-25	36-60	30.0-50.0	3.6-5.5	---	---
	25-80	---	---	---	---	---
313F2:						
Gosport	0-5	27-34	15.0-20.0	5.1-7.3	---	---
	5-23	36-60	30.0-50.0	3.6-5.5	---	---
	23-80	---	---	---	---	---
313G:						
Gosport	0-7	18-27	15.0-20.0	5.1-6.5	---	---
	7-22	36-60	30.0-50.0	3.6-5.5	---	---
	22-80	---	---	---	---	---
315:						
Nodaway	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
Klum	0-7	5-18	10.0-15.0	5.6-7.3	---	---
	7-44	5-18	10.0-15.0	5.6-7.3	---	---
	44-80	3-18	10.0-15.0	6.1-7.3	---	---
Perks	0-9	2-10	5.0-10.0	5.6-7.3	---	---
	9-80	2-10	5.0-10.0	5.6-7.3	---	---
362:						
Haig	0-12	22-27	36.0-41.0	5.6-7.3	---	---
	12-16	28-48	36.0-41.0	5.1-6.0	---	---
	16-46	40-50	36.0-41.0	5.1-6.0	---	---
	46-60	28-40	36.0-41.0	6.1-7.3	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
363:						
Haig------------	0-12	32-40	36.0-41.0	5.6-7.3	---	---
	12-16	28-48	36.0-41.0	5.1-6.0	---	---
	16-46	40-50	36.0-41.0	5.1-6.0	---	---
	46-60	28-40	36.0-41.0	6.1-7.3	---	---
364B:						
Grundy----------	0-16	12-27	8.0-18.0	5.6-7.3	---	---
	16-20	32-45	16.0-24.0	5.6-6.5	---	---
	20-40	40-50	20.0-26.0	5.1-7.3	---	---
	40-60	28-35	14.0-19.0	5.6-7.3	---	---
364B2:						
Grundy----------	0-8	28-35	15.0-22.0	5.6-7.3	---	---
	8-15	32-45	16.0-24.0	5.6-6.5	---	---
	15-35	40-50	20.0-26.0	5.1-7.3	---	---
	35-60	28-35	14.0-19.0	5.6-7.3	---	---
423D2:						
Bucknell--------	0-5	27-38	20.0-25.0	5.1-7.3	---	---
	5-45	38-50	36.0-41.0	4.5-6.0	---	---
	45-60	30-40	30.0-36.0	5.6-7.3	---	---
424D2:						
Lindley---------	0-7	18-27	10.0-16.0	4.5-7.3	---	---
	7-43	25-35	15.0-20.0	4.5-6.5	---	---
	43-60	18-32	10.0-16.0	6.1-7.8	---	---
Keswick---------	0-4	22-27	20.0-25.0	4.5-7.3	---	---
	4-31	35-60	30.0-50.0	4.5-6.0	---	---
	31-80	30-40	30.0-36.0	4.5-7.8	0-15	---
424E2:						
Lindley---------	0-6	18-27	10.0-16.0	4.5-7.3	---	---
	6-42	25-35	15.0-20.0	4.5-6.5	---	---
	42-60	18-32	10.0-16.0	6.1-7.8	---	---
Keswick---------	0-4	22-27	20.0-25.0	4.5-7.3	---	---
	4-29	35-60	30.0-50.0	4.5-6.0	---	---
	29-80	30-40	30.0-36.0	4.5-7.8	0-15	---
425D:						
Keswick---------	0-17	22-27	20.0-25.0	4.5-7.3	---	---
	17-38	35-60	30.0-50.0	4.5-6.0	---	---
	38-80	30-40	30.0-36.0	4.5-7.8	0-15	---
425D2:						
Keswick---------	0-4	22-27	20.0-25.0	4.5-7.3	---	---
	4-31	35-60	30.0-50.0	4.5-6.0	---	---
	31-80	30-40	30.0-36.0	4.5-7.8	0-15	---
432C2:						
Gorin-----------	0-5	12-30	6.0-16.0	4.5-7.3	---	---
	5-10	27-42	15.0-22.0	4.5-6.5	---	---
	10-32	35-60	18.0-30.0	4.5-6.0	---	---
	32-54	27-40	14.0-20.0	4.5-7.3	---	---
	54-80	35-60	18.0-30.0	4.5-7.3	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
432D:						
Gorin-----------	0-9	12-30	6.0-16.0	4.5-7.3	---	---
	9-14	27-42	15.0-22.0	4.5-6.5	---	---
	14-37	35-60	18.0-30.0	4.5-6.0	---	---
	37-59	27-40	14.0-20.0	4.5-7.3	---	---
	59-80	35-60	18.0-30.0	4.5-7.3	---	---
432D2:						
Gorin-----------	0-5	12-30	6.0-16.0	4.5-7.3	---	---
	5-10	27-42	15.0-22.0	4.5-6.5	---	---
	10-30	35-60	18.0-30.0	4.5-6.0	---	---
	30-52	27-40	14.0-20.0	4.5-7.3	---	---
	52-80	35-60	18.0-30.0	4.5-7.3	---	---
453:						
Tuskeego--------	0-9	16-22	20.0-25.0	5.1-7.3	---	---
	9-20	18-30	20.0-25.0	5.1-6.5	---	---
	20-45	32-48	30.0-36.0	5.1-6.5	---	---
	45-60	28-40	20.0-30.0	5.6-6.5	---	---
460:						
Mt. Sterling----	0-7	18-27	25.0-30.0	5.6-7.3	---	---
	7-26	18-30	25.0-30.0	5.6-7.3	---	---
	26-54	35-44	25.0-30.0	4.5-7.8	---	---
	54-80	35-45	25.0-30.0	4.5-7.8	5-10	---
520:						
Coppock---------	0-9	16-26	20.0-25.0	6.1-7.3	---	---
	9-25	16-27	20.0-25.0	5.6-7.3	---	---
	25-59	25-35	20.0-25.0	4.5-6.0	---	---
	59-80	24-40	20.0-25.0	4.5-6.0	---	---
520B:						
Coppock---------	0-9	16-26	20.0-25.0	6.1-7.3	---	---
	9-25	16-27	20.0-25.0	5.6-7.3	---	---
	25-59	25-35	20.0-25.0	4.5-6.0	---	---
	59-80	24-40	20.0-25.0	4.5-6.0	---	---
531B:						
Kniffin---------	0-13	22-26	20.0-25.0	4.5-7.3	---	---
	13-30	48-56	36.0-41.0	4.5-6.0	---	---
	30-60	32-40	25.0-30.0	5.1-7.3	---	---
531B2:						
Kniffin---------	0-10	28-34	25.0-30.0	4.5-7.3	---	---
	10-15	48-56	36.0-41.0	4.5-6.0	---	---
	15-60	32-40	25.0-30.0	5.1-7.3	---	---
531C2:						
Kniffin---------	0-10	28-34	25.0-30.0	4.5-7.3	---	---
	10-15	48-56	36.0-41.0	4.5-6.0	---	---
	15-60	32-40	25.0-30.0	5.1-7.3	---	---
532B:						
Rathbun---------	0-12	16-22	15.0-20.0	4.5-7.3	---	---
	12-32	48-56	41.0-50.0	4.5-5.5	---	---
	32-80	32-40	30.0-36.0	5.6-6.5	---	---
532C:						
Rathbun---------	0-12	16-22	15.0-20.0	4.5-7.3	---	---
	12-30	48-56	41.0-50.0	4.5-5.5	---	---
	30-80	32-40	30.0-36.0	5.6-6.5	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
532C2:						
Rathbun----------	0-10	28-34	20.0-25.0	4.5-7.3	---	---
	10-28	48-56	41.0-50.0	4.5-5.5	---	---
	28-80	32-40	30.0-36.0	5.6-6.5	---	---
534:						
Carlow----------	0-13	40-50	22.0-29.0	5.1-7.3	---	---
	13-60	45-60	23.0-31.0	4.5-6.0	---	---
592D2:						
Mystic----------	0-7	27-35	25.0-30.0	4.5-7.3	---	---
	7-80	30-48	25.0-30.0	4.5-6.5	---	---
594D2:						
Galland----------	0-9	22-27	20.0-25.0	5.6-7.3	---	---
	9-60	35-48	25.0-35.0	4.5-6.0	---	---
598G:						
Bucklick--------	0-10	15-25	10.0-17.0	4.5-7.3	---	---
	10-46	35-45	18.0-23.0	4.5-7.3	---	---
	46-56	---	---	---	---	---
599G:						
Nordness--------	0-2	18-24	15.0-20.0	5.6-7.3	---	---
	2-5	22-29	15.0-20.0	5.6-7.3	---	---
	5-11	22-35	20.0-25.0	6.6-7.3	---	---
	11-21	---	---	---	---	---
Gosport----------	0-7	18-27	15.0-20.0	5.1-6.5	---	---
	7-22	36-60	30.0-50.0	3.6-5.5	---	---
	22-80	---	---	---	---	---
632B:						
Adco------------	0-8	15-30	10.0-18.0	4.5-7.3	---	---
	8-14	15-30	10.0-18.0	4.5-6.5	---	---
	14-18	50-60	25.0-31.0	5.1-6.5	---	---
	18-33	32-50	18.0-25.0	5.1-7.3	---	---
	33-60	15-35	8.0-15.0	5.6-7.3	---	---
699G:						
Nordness--------	0-2	18-24	15.0-20.0	5.6-7.3	---	---
	2-5	22-29	15.0-20.0	5.6-7.3	---	---
	5-11	22-35	20.0-25.0	6.6-7.3	---	---
	11-21	---	---	---	---	---
Bentonsport-----	0-18	15-35	11.0-28.0	7.4-8.4	5-30	---
	18-32	18-35	15.0-25.0	7.4-8.4	5-30	---
	32-48	18-35	15.0-25.0	7.4-8.4	5-30	---
	48-70	18-35	15.0-25.0	7.4-8.4	5-30	---
	70-75	15-27	15.0-25.0	7.4-8.4	---	---
	75-99	---	---	---	---	---
719B:						
Creal-----------	0-9	20-27	14.0-22.0	5.6-7.3	---	---
	9-30	18-25	11.0-16.0	3.6-7.3	---	---
	30-63	25-35	15.0-22.0	4.5-6.5	---	---
	63-80	20-27	12.0-17.0	4.5-7.3	---	---
720:						
Racoon----------	0-9	20-27	14.0-20.0	4.5-7.3	---	---
	9-30	18-25	11.0-16.0	4.5-7.3	---	---
	30-63	27-35	17.0-23.0	4.5-5.5	---	---
	63-80	18-30	10.0-20.0	5.6-7.3	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
729:						
Nodaway---------	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
Coppock---------	0-9	16-26	20.0-25.0	6.1-7.3	---	---
	9-25	16-27	20.0-25.0	5.6-7.3	---	---
	25-59	25-35	20.0-25.0	4.5-6.0	---	---
	59-80	24-40	20.0-25.0	4.5-6.0	---	---
730B:						
Nodaway---------	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
Coppock---------	0-9	16-26	20.0-25.0	6.1-7.3	---	---
	9-25	16-27	20.0-25.0	5.6-7.3	---	---
	25-59	25-35	20.0-25.0	4.5-6.0	---	---
	59-80	24-40	20.0-25.0	4.5-6.0	---	---
Cantril---------	0-21	14-27	15.0-20.0	5.1-7.3	---	---
	21-80	27-35	20.0-25.0	5.1-6.5	---	---
792D2:						
Armstrong-------	0-8	35-42	30.0-35.0	5.6-7.3	---	---
	8-69	36-60	41.0-50.0	4.5-6.5	---	---
	69-80	30-36	30.0-35.0	5.1-7.8	---	---
795C2:						
Ashgrove--------	0-5	27-40	30.0-35.0	4.5-7.3	---	---
	5-14	35-45	30.0-35.0	4.5-6.5	---	---
	14-66	40-60	41.0-50.0	4.5-7.3	---	---
	66-80	27-32	10.0-16.0	6.1-7.8	---	---
795D:						
Ashgrove--------	0-8	27-40	30.0-35.0	4.5-7.3	---	---
	8-17	35-45	30.0-35.0	4.5-6.5	---	---
	17-67	40-60	41.0-50.0	4.5-7.3	---	---
	67-80	27-32	10.0-16.0	6.1-7.8	---	---
795D2:						
Ashgrove--------	0-5	27-40	30.0-35.0	4.5-7.3	---	---
	5-14	35-45	30.0-35.0	4.5-6.5	---	---
	14-62	40-60	41.0-50.0	4.5-7.3	---	---
	62-80	27-32	10.0-16.0	6.1-7.8	---	---
831B:						
Pershing--------	0-15	20-27	20.0-25.0	4.5-7.3	---	---
	15-17	27-35	25.0-30.0	5.1-6.0	---	---
	17-49	35-48	30.0-36.0	5.1-6.0	---	---
	49-60	24-40	25.0-30.0	5.1-6.5	---	---
831C2:						
Pershing--------	0-6	27-38	25.0-30.0	4.5-7.3	---	---
	6-11	27-35	25.0-30.0	5.1-6.0	---	---
	11-42	35-48	30.0-36.0	5.1-6.0	---	---
	42-60	24-40	25.0-30.0	5.1-6.5	---	---
832B:						
Weller----------	0-12	16-27	15.0-20.0	4.5-7.3	---	---
	12-47	28-48	30.0-35.0	4.5-6.0	---	---
	47-60	25-40	25.0-30.0	5.1-6.5	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
832C:						
Weller----------	0-12	16-27	15.0-20.0	4.5-7.3	---	---
	12-45	28-48	30.0-35.0	4.5-6.0	---	---
	45-60	25-40	25.0-30.0	5.1-6.5	---	---
832C2:						
Weller----------	0-6	27-36	25.0-30.0	4.5-7.3	---	---
	6-43	28-48	30.0-35.0	4.5-6.0	---	---
	43-60	25-40	25.0-30.0	5.1-6.5	---	---
832D2:						
Weller----------	0-6	27-36	25.0-30.0	4.5-7.3	---	---
	6-41	28-48	30.0-35.0	4.5-6.0	---	---
	41-60	25-40	25.0-30.0	5.1-6.5	---	---
880B:						
Clinton---------	0-9	16-26	15.0-20.0	5.1-7.3	---	---
	9-34	36-42	25.0-30.0	4.5-6.0	---	---
	34-80	24-35	20.0-25.0	6.1-6.5	---	---
880C:						
Clinton---------	0-8	16-26	15.0-20.0	5.1-7.3	---	---
	8-33	36-42	25.0-30.0	4.5-6.0	---	---
	33-60	24-35	20.0-25.0	6.1-6.5	---	---
	60-80	17-30	5.0-25.0	4.5-6.0	---	---
880C2:						
Clinton---------	0-8	27-34	25.0-30.0	5.1-7.3	---	---
	8-28	36-42	25.0-30.0	4.5-6.0	---	---
	28-60	24-35	20.0-25.0	6.1-6.5	---	---
	60-80	17-30	5.0-25.0	4.5-6.0	---	---
880D:						
Clinton---------	0-8	16-26	15.0-20.0	5.1-7.3	---	---
	8-32	36-42	25.0-30.0	4.5-6.0	---	---
	32-60	24-35	20.0-25.0	6.1-6.5	---	---
	60-80	17-30	5.0-25.0	4.5-6.0	---	---
880D2:						
Clinton---------	0-7	27-34	25.0-30.0	5.1-7.3	---	---
	7-27	36-42	25.0-30.0	4.5-6.0	---	---
	27-60	24-35	20.0-25.0	6.1-6.5	---	---
	60-80	17-30	5.0-25.0	4.5-6.0	---	---
977:						
Richwood--------	0-16	15-22	7.0-30.0	5.6-7.3	---	---
	16-54	18-30	4.0-25.0	5.6-7.3	---	---
	54-88	10-20	2.0-15.0	5.6-7.3	---	---
993D2:						
Gara------------	0-7	27-35	25.0-30.0	5.6-7.3	---	---
	7-47	25-38	25.0-30.0	4.5-6.5	---	---
	47-60	24-38	25.0-30.0	5.6-8.4	0-25	---
Armstrong-------	0-8	35-42	30.0-35.0	5.6-7.3	---	---
	8-69	36-60	41.0-50.0	4.5-6.5	---	---
	69-80	30-36	30.0-35.0	5.1-7.8	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
994D2:						
Galland	0-9	22-27	20.0-25.0	5.6-7.3	---	---
	9-60	35-48	25.0-35.0	4.5-6.0	---	---
Douds	0-5	20-27	15.0-20.0	5.1-7.3	---	---
	5-51	26-35	15.0-20.0	4.5-6.0	---	---
	51-80	5-30	5.0-20.0	5.1-6.0	---	---
994E2:						
Galland	0-9	22-27	20.0-25.0	5.6-7.3	---	---
	9-60	35-48	25.0-35.0	4.5-6.0	---	---
Douds	0-4	20-27	15.0-20.0	5.1-7.3	---	---
	4-49	26-35	15.0-20.0	4.5-6.0	---	---
	49-80	5-30	5.0-20.0	5.1-6.0	---	---
1130:						
Belinda	0-9	16-22	20.0-25.0	5.6-7.3	---	---
	9-17	18-27	20.0-25.0	4.5-6.0	---	---
	17-39	28-52	30.0-36.0	4.5-6.5	---	---
	39-60	28-40	30.0-36.0	5.1-6.0	---	---
1260:						
Beckwith	0-5	16-22	15.0-20.0	4.5-7.3	---	---
	5-14	18-27	15.0-20.0	4.5-5.5	---	---
	14-54	40-52	36.0-41.0	5.1-6.0	---	---
	54-60	28-40	30.0-36.0	5.6-6.5	---	---
1715:						
Nodaway	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
Vesser	0-12	20-26	25.0-30.0	5.6-7.3	---	---
	12-25	18-22	20.0-25.0	5.1-6.0	---	---
	25-80	30-35	25.0-30.0	5.1-6.5	---	---
Mt. Sterling	0-7	18-27	25.0-30.0	5.6-7.3	---	---
	7-26	18-30	25.0-30.0	5.6-7.3	---	---
	26-54	35-44	25.0-30.0	4.5-7.8	---	---
	54-80	35-45	25.0-30.0	4.5-7.8	5-10	---
1977:						
Keosauqua	0-22	18-26	20.0-25.0	5.6-7.3	---	---
	22-50	18-36	20.0-25.0	5.6-7.3	---	---
	50-80	5-20	20.0-25.0	6.1-7.3	---	---
3051:						
Vesser	0-12	20-26	25.0-30.0	5.6-7.3	---	---
	12-25	18-22	20.0-25.0	5.1-6.0	---	---
	25-80	30-35	25.0-30.0	5.6-6.5	---	---
3054:						
Zook	0-19	35-40	36.0-41.0	5.6-7.3	---	---
	19-37	36-45	36.0-41.0	5.6-7.8	---	---
	37-80	20-45	30.0-36.0	5.6-7.8	---	---
3133:						
Colo	0-20	27-36	36.0-41.0	5.6-7.3	---	---
	20-63	30-35	36.0-41.0	5.6-7.3	---	---
	63-80	25-35	30.0-36.0	6.1-7.3	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
3139:						
Perks-----------	0-9	2-10	5.0-10.0	5.6-7.3	---	---
	9-80	2-10	5.0-10.0	5.6-7.3	---	---
3208:						
Klum------------	0-7	5-18	10.0-15.0	5.6-7.3	---	---
	7-44	5-18	10.0-15.0	5.6-7.3	---	---
	44-80	3-18	10.0-15.0	6.1-7.3	---	---
3220:						
Nodaway---------	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
3315:						
Nodaway---------	0-7	18-27	20.0-25.0	6.1-7.3	---	0-2
	7-60	18-28	20.0-25.0	6.1-7.3	---	0-2
Klum------------	0-7	5-18	10.0-15.0	5.6-7.3	---	---
	7-44	5-18	10.0-15.0	5.6-7.3	---	---
	44-80	3-18	10.0-15.0	6.1-7.3	---	---
Perks-----------	0-9	2-10	5.0-10.0	5.6-7.3	---	---
	9-80	2-10	5.0-10.0	5.6-7.3	---	---
3484:						
Lawson----------	0-8	10-27	11.0-28.0	6.1-7.4	---	---
	8-44	10-30	11.0-29.0	6.1-7.4	---	---
	44-80	18-30	11.0-23.0	6.1-7.4	---	---
3520:						
Coppock---------	0-9	16-26	20.0-25.0	6.1-7.3	---	---
	9-25	16-27	20.0-25.0	5.6-7.3	---	---
	25-59	25-35	20.0-25.0	4.5-6.0	---	---
	59-80	24-40	20.0-25.0	4.5-6.0	---	---
3587:						
Chequest--------	0-11	30-35	25.0-30.0	5.1-7.3	---	---
	11-80	35-42	25.0-30.0	5.1-6.0	---	---
3720:						
Racoon----------	0-9	20-27	14.0-20.0	4.5-7.3	---	---
	9-30	18-25	11.0-16.0	4.5-7.3	---	---
	30-63	27-35	17.0-23.0	4.5-5.5	---	---
	63-80	18-30	10.0-20.0	5.6-7.3	---	---
5010:						
Pits, sand and gravel.						
5020:						
Pits and Dumps.						
5030:						
Pits, limestone quarries.						
5040:						
Orthents--------	0-60	2-18	---	---	---	---
	60-80	---	---	---	---	---

Table 22.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate	Salinity
	In	Pct	meq/100g	pH	Pct	mmhos/cm
5047:						
Aquents.						

Table 23.--Water 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	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
13B:									
Olmitz	B	None	---	---	>6.0	---	---	---	---
Vesser	C	None	---	---	1.0-3.0	Apparent	Nov-Jul	---	---
Zook	C/D	None	---	---	1.0-3.0	Apparent	Nov-Jul	---	---
23C2:									
Arispe	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
51:									
Vesser	C	Occasional	Brief	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	---	---
51+:									
Vesser	C	Occasional	Brief	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	---	---
51B:									
Vesser	C	Rare	---	---	1.0-3.0	Apparent	Nov-Jul	---	---
54:									
Zook	C/D	Occasional	Long	Feb-Nov	0.0-3.0	Apparent	Nov-Jul	---	---
58D:									
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
58D2:									
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
58E2:									
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
58F2:									
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
58G:									
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
65D:									
Lindley	C	None	---	---	>6.0	---	---	---	---
65D2:									
Lindley	C	None	---	---	>6.0	---	---	---	---
65E:									
Lindley	C	None	---	---	>6.0	---	---	---	---
65E2:									
Lindley	C	None	---	---	>6.0	---	---	---	---
65F2:									
Lindley	C	None	---	---	>6.0	---	---	---	---
65G:									
Lindley	C	None	---	---	>6.0	---	---	---	---
80B:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
80C:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
80C2:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
80D:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
80D2:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
130:									
Belinda	D	None	---	---	0.5-2.0	Apparent	Nov-Jul	---	---
131B:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
131B2:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
131C:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
131C2:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
132B:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
132C:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
132C2:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
139:									
Perks	A	Occasional	Brief	Feb-Nov	>6.0	---	---	---	---
139B:									
Perks	A	Rare	---	---	>6.0	---	---	---	---
172:									
Wabash	D	Occasional	Long	Feb-Nov	0.0-1.0	Apparent	Nov-Jul	---	---
173:									
Hoopeston	B	None	---	---	1.0-3.0	Apparent	Nov-Jul	---	---
179D2:									
Gara	C	None	---	---	>6.0	---	---	---	---
179E2:									
Gara	C	None	---	---	>6.0	---	---	---	---
197:									
Reedscreek	B	Occasional	Brief	Feb-Nov	>6.0	---	---	---	---
208:									
Klum	B	Occasional	Brief	Feb-Nov	3.0-6.0	Apparent	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table and ponding				
		Frequency	Duration	Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
211:									
Edina	D	None	---	---	0.0-1.0	Apparent	Nov-Jul	Long	0.5
220:									
Nodaway	B	Occasional	Brief	Feb-Nov	3.0-5.0	Apparent	Nov-Jul	---	---
222C2:									
Clarinda	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
223C2:									
Rinda	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
231:									
Edina	D	None	---	---	0.0-1.0	Apparent	Nov-Jul	---	---
260:									
Beckwith	D	None	---	---	0.0-1.0	Apparent	Nov-Jul		---
261:									
Appanoose	D	None	---	---	0.0-1.0	Apparent	Nov-Jul	---	---
263:									
Okaw	D	Rare	---	---	0.0-1.0	Apparent	Nov-Jul		---
273B:									
Olmitz	B	None	---	---	>6.0	---	---	---	---
273C:									
Olmitz	B	None	---	---	>6.0	---	---	---	---
312B:									
Seymour	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	---	---
312B2:									
Seymour	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	---	---
313D2:									
Gosport	C	None	---	---	>6.0	---	---	---	---
313E2:									
Gosport	C	None	---	---	>6.0	---	---	---	---
313F2:									
Gosport	C	None	---	---	>6.0	---	---	---	---
313G:									
Gosport	C	None	---	---	>6.0		---	---	---
315:									
Nodaway	B	Occasional	Brief	Feb-Nov	3.0-5.0	Apparent	Nov-Jul	---	---
Klum	B	Occasional	Brief	Feb-Nov	3.0-6.0	Apparent	Nov-Nov	---	---
Perks	A	Occasional	Brief	Feb-Nov	>6.0	---	---	---	---
362:									
Haig	C/D	None	---	---	1.0-2.0	Apparent	Nov-Jul	---	---
363:									
Haig	C/D	None	---	---	1.0-2.0	Apparent	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
364B:									
Grundy----------	C	None-------	---	---	1.0-2.5	Perched----	Nov-Jul	---	---
364B2:									
Grundy----------	C	None-------	---	---	1.0-2.5	Perched----	Nov-Jul	---	---
423D2:									
Bucknell--------	D	None-------	---	---	1.0-3.0	Perched----	Nov-Jul	---	---
424D2:									
Lindley---------	C	None-------	---	---	>6.0	---	---	---	---
Keswick---------	C	None-------	---	---	1.0-3.0	Perched----	Nov-Jul	---	---
424E2:									
Lindley---------	C	None-------	---	---	>6.0	---	---	---	---
Keswick---------	C	None-------	---	---	1.0-3.0	Perched----	Nov-Jul	---	---
425D:									
Keswick---------	C	None-------	---	---	1.0-3.0	Perched----	Nov-Jul	---	---
425D2:									
Keswick---------	C	None-------	---	---	1.0-3.0	Perched----	Nov-Jul	---	---
432C2:									
Gorin-----------	C	None-------	---	---	1.5-2.5	Perched----	Nov-Jul	---	---
432D:									
Gorin-----------	C	None-------	---	---	1.5-2.5	Perched----	Nov-Jul	---	---
432D2:									
Gorin-----------	C	None-------	---	---	1.5-2.5	Perched----	Nov-Jul	---	---
453:									
Tuskeego--------	C/D	Rare-------	---	---	0.0-1.0	Apparent---	Nov-Jul	---	---
460:									
Mt. Sterling----	B	Occasional	Brief-----	Feb-Nov	0.0-1.0	Apparent---	Nov-Jul	---	---
520:									
Coppock---------	B	Occasional	Brief-----	Feb-Nov	1.0-3.0	Apparent---	Nov-Jul	---	---
520B:									
Coppock---------	B	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
531B:									
Kniffin---------	C	None-------	---	---	2.0-4.0	Apparent---	Nov-Jul	---	---
531B2:									
Kniffin---------	C	None-------	---	---	2.0-4.0	Apparent---	Nov-Jul	---	---
531C2:									
Kniffin---------	C	None-------	---	---	2.0-4.0	Apparent---	Nov-Jul	---	---
532B:									
Rathbun---------	C	None-------	---	---	2.0-4.0	Apparent---	Nov-Jul	---	---
532C:									
Rathbun---------	C	None-------	---	---	2.0-4.0	Apparent---	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
532C2:									
Rathbun	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	---	---
534:									
Carlow	D	Occasional	Long	Feb-Nov	0.0-1.0	Apparent	Nov-Jul	---	---
592D2:									
Mystic	C	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
594D2:									
Galland	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
598G:									
Bucklick	C	None	---	---	>6.0	---	---	---	---
599G:									
Nordness	B	None	---	---	>6.0	---	---	---	---
Gosport	C	None	---	---	>6.0	---	---	---	---
632B:									
Adco	D	None	---	---	1.0-2.5	Perched	Nov-Jul	---	---
699G:									
Nordness	B	None	---	---	>6.0	---	---	---	---
Bentonsport	B	None	---	---	>6.0	---	---	---	---
719B:									
Creal	C	Rare	---	---	1.5-3.0	Apparent	Nov-Jul	---	---
720:									
Racoon	C/D	Occasional	Brief	Feb-Nov	0.0-1.0	Apparent	Nov-Jul	---	---
729:									
Nodaway	B	Occasional	Brief	Feb-Nov	3.0-5.0	Apparent	Apr-Jul	---	---
Coppock	B	Occasional	Brief	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	---	---
730B:									
Nodaway	B	Occasional	Brief	Feb-Nov	3.0-5.0	Apparent	Apr-Jul	---	---
Coppock	B	Rare	---	---	1.0-3.0	Apparent	Nov-Jul	---	---
Cantril	B	Rare	---	---	2.0-4.0	Apparent	Nov-Jul	---	---
792D2:									
Armstrong	C	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
795C2:									
Ashgrove	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
795D:									
Ashgrove	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
795D2:									
Ashgrove	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
831B:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
831C2:									
Pershing	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
832B:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
832C:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
832C2:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
832D2:									
Weller	C	None	---	---	2.0-4.0	Perched	Nov-Jul	---	---
880B:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
880C:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
880C2:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
880D:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
880D2:									
Clinton	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
977:									
Richwood	B	None	---	---	>6.0	---	---	---	---
993D2:									
Gara	C	None	---	---	>6.0	---	---	---	---
Armstrong	C	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
994D2:									
Galland	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
994E2:									
Galland	D	None	---	---	1.0-3.0	Perched	Nov-Jul	---	---
Douds	B	None	---	---	4.0-6.0	Apparent	Nov-Jul	---	---
1130:									
Belinda	D	None	---	---	0.5-2.0	Apparent	Nov-Jul	---	---
1260:									
Beckwith	D	None	---	---	0.0-1.0	Apparent	Nov-Jul	---	---
1715:									
Nodaway	B	Occasional	Brief	Feb-Nov	3.0-5.0	Apparent	Nov-Jul	---	---
Vesser	C	Occasional	Brief	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	---	---
Mt. Sterling	B	Occasional	Brief	Feb-Nov	0.0-1.0	Apparent	Nov-Jul	---	---

Table 23.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table and ponding: Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
1977:									
Keosauqua-------	B	None-------	---	---	>6.0	---	---	---	---
3051:									
Vesser----------	C	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
3054:									
Zook------------	C/D	Rare-------	---	---	0.0-3.0	Apparent---	Nov-Jul	---	---
3133:									
Colo------------	B/D	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
3139:									
Perks-----------	A	Rare-------	---	---	>6.0	---	---	---	---
3208:									
Klum------------	B	Rare-------	---	---	3.0-6.0	Apparent---	Nov-Jul	---	---
3220:									
Nodaway---------	B	Rare-------	---	---	3.0-5.0	Apparent---	Nov-Jul	---	---
3315:									
Nodaway---------	B	Rare-------	---	---	3.0-5.0	Apparent---	Nov-Jul	---	---
Klum------------	B	Rare-------	---	---	3.0-6.0	Apparent---	Nov-Jul	---	---
Perks-----------	A	Rare-------	---	---	>6.0	---	---	---	---
3484:									
Lawson----------	C	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
3520:									
Coppock---------	B	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
3587:									
Chequest--------	C	Rare-------	---	---	1.0-3.0	Apparent---	Nov-Jul	---	---
3720:									
Racoon----------	C/D	Rare-------	---	---	0.0-1.0	Apparent---	Nov-Jul	---	---
5010:									
Pits, sand and gravel---------	A	None-------	---	---	>6.0	---	---	---	---
5020:									
Pits and Dumps--	A	None-------	---	---	>6.0	---	---	---	---
5030:									
Pits, limestone quarries-------	A	None-------	---	---	>6.0	---	---	---	---
5040:									
Orthents--------	---	None-------	---	---	>6.0	---	---	---	---
5047:									
Aquents---------	---	Occasional	---	---	0.0-1.0	Apparent---	Nov-Jul	Very long	1.0

Table 24.--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	Bedrock		Potential frost action	Risk of corrosion	
	Depth	Hardness		Uncoated steel	Concrete
	In				
13B:					
Olmitz	>80	---	Moderate	Moderate	Moderate.
Vesser	>80	---	High	High	Moderate.
Zook	>80	---	High	High	Moderate.
23C2:					
Arispe	>80	---	High	High	Moderate.
51:					
Vesser	>80	---	High	High	Moderate.
51+:					
Vesser	>80	---	High	High	Moderate.
51B:					
Vesser	>80	---	High	High	Moderate.
54:					
Zook	>80	---	High	High	Moderate.
58D:					
Douds	>80	---	Moderate	Moderate	Moderate.
58D2:					
Douds	>80	---	Moderate	Moderate	Moderate.
58E2:					
Douds	>80	---	Moderate	Moderate	Moderate.
58F2:					
Douds	>80	---	Moderate	Moderate	Moderate.
58G:					
Douds	>80	---	Moderate	Moderate	Moderate.
65D:					
Lindley	>60	---	Moderate	Moderate	Moderate.
65D2:					
Lindley	>60	---	Moderate	Moderate	Moderate.
65E:					
Lindley	>60	---	Moderate	Moderate	Moderate.
65E2:					
Lindley	>60	---	Moderate	Moderate	Moderate.
65F2:					
Lindley	>60	---	Moderate	Moderate	Moderate.
65G:					
Lindley	>60	---	Moderate	Moderate	Moderate.
80B:					
Clinton	>80	---	Moderate	Moderate	Moderate.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
80C:					
Clinton	>80	---	Moderate	Moderate	Moderate.
80C2:					
Clinton	>80	---	Moderate	Moderate	Moderate.
80D:					
Clinton	>80	---	Moderate	Moderate	Moderate.
80D2:					
Clinton	>80	---	Moderate	Moderate	Moderate.
130:					
Belinda	>60	---	Moderate	High	Moderate.
131B:					
Pershing	>60	---	High	High	Moderate.
131B2:					
Pershing	>60	---	High	High	Moderate.
131C:					
Pershing	>60	---	High	High	Moderate.
131C2:					
Pershing	>60	---	High	High	Moderate.
132B:					
Weller	>60	---	High	High	High.
132C:					
Weller	>60	---	High	High	High.
132C2:					
Weller	>60	---	High	High	High.
139:					
Perks	>80	---	Low	Low	Moderate.
139B:					
Perks	>80	---	Low	Low	Moderate.
172:					
Wabash	>60	---	Moderate	High	Moderate.
173:					
Hoopeston	>80	---	High	Low	Moderate.
179D2:					
Gara	>60	---	Moderate	Moderate	Moderate.
179E2:					
Gara	>60	---	Moderate	Moderate	Moderate.
197:					
Reedscreek	48-72	Hard	Moderate	Low	Low.
208:					
Klum	>80	---	Moderate	Low	Low.
211:					
Edina	>60	---	Moderate	High	Moderate.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock Depth	Bedrock Hardness	Potential frost action	Risk of corrosion Uncoated steel	Risk of corrosion Concrete
	In				
220:					
Nodaway	>60	---	High	Moderate	Low.
222C2:					
Clarinda	>80	---	High	High	Moderate.
223C2:					
Rinda	>60	---	High	High	Moderate.
231:					
Edina	>60	---	Moderate	High	Moderate.
260:					
Beckwith	>60	---	Moderate	High	Moderate.
261:					
Appanoose	>60	---	Moderate	High	Moderate.
263:					
Okaw	>80	---	High	High	High.
273B:					
Olmitz	>80	---	Moderate	Moderate	Moderate.
273C:					
Olmitz	>80	---	Moderate	Moderate	Moderate.
312B:					
Seymour	>60	---	Moderate	High	Moderate.
312B2:					
Seymour	>60	---	Moderate	High	Moderate.
313D2:					
Gosport	20-40	Soft	Moderate	High	High.
313E2:					
Gosport	20-40	Soft	Moderate	High	High.
313F2:					
Gosport	20-40	Soft	Moderate	High	High.
313G:					
Gosport	20-40	Soft	Moderate	High	High.
315:					
Nodaway	>60	---	High	Moderate	Low.
Klum	>80	---	Moderate	Low	Low.
Perks	>80	---	Low	Low	Moderate.
362:					
Haig	>60	---	High	High	Moderate.
363:					
Haig	>60	---	High	High	Moderate.
364B:					
Grundy	>60	---	High	High	Moderate.
364B2:					
Grundy	>60	---	High	High	Moderate.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock Depth	Bedrock Hardness	Potential frost action	Risk of corrosion Uncoated steel	Risk of corrosion Concrete
	In				
423D2:					
Bucknell	>60	---	Moderate	High	Moderate.
424D2:					
Lindley	>60	---	Moderate	Moderate	Moderate.
Keswick	>80	---	High	High	Moderate.
424E2:					
Lindley	>60	---	Moderate	Moderate	Moderate.
Keswick	>80	---	High	High	Moderate.
425D:					
Keswick	>80	---	High	High	Moderate.
425D2:					
Keswick	>80	---	High	High	Moderate.
432C2:					
Gorin	>80	---	High	High	Moderate.
432D:					
Gorin	>80	---	High	High	Moderate.
432D2:					
Gorin	>80	---	High	High	Moderate.
453:					
Tuskeego	>60	---	Moderate	High	Moderate.
460:					
Mt. Sterling	>80	---	High	High	Low.
520:					
Coppock	>80	---	High	High	Moderate.
520B:					
Coppock	>80	---	High	High	Moderate.
531B:					
Kniffin	>60	---	Moderate	High	Moderate.
531B2:					
Kniffin	>60	---	Moderate	High	Moderate.
531C2:					
Kniffin	>60	---	Moderate	High	Moderate.
532B:					
Rathbun	>80	---	Moderate	High	Moderate.
532C:					
Rathbun	>80	---	Moderate	High	Moderate.
532C2:					
Rathbun	>80	---	Moderate	High	Moderate.
534:					
Carlow	>60	---	Moderate	High	Moderate.
592D2:					
Mystic	>80	---	High	Moderate	Moderate.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
594D2:					
Galland	>60	---	High	High	Moderate.
598G:					
Bucklick	40-60	Hard	Moderate	Moderate	Moderate.
599G:					
Nordness	8-20	Hard	Low	Low	Low.
Gosport	20-40	Soft	Moderate	High	High.
632B:					
Adco	>60	---	High	High	Moderate.
699G:					
Nordness	8-20	Hard	Low	Low	Low.
Bentonsport	36-80	Soft	Moderate	High	High.
719B:					
Creal	>80	---	High	High	High.
720:					
Racoon	>80	---	High	High	High.
729:					
Nodaway	>60	---	High	Moderate	Low.
Coppock	>80	---	High	High	Moderate.
730B:					
Nodaway	>80	---	High	Moderate	Low.
Coppock	>80	---	High	High	Moderate.
Cantril	>80	---	High	Moderate	Low.
792D2:					
Armstrong	>80	---	High	High	Moderate.
795C2:					
Ashgrove	>80	---	High	High	Moderate.
795D:					
Ashgrove	>80	---	High	High	Moderate.
795D2:					
Ashgrove	>80	---	High	High	Moderate.
831B:					
Pershing	>60	---	High	High	Moderate.
831C2:					
Pershing	>60	---	High	High	Moderate.
832B:					
Weller	>60	---	High	High	High.
832C:					
Weller	>60	---	High	High	High.
832C2:					
Weller	>60	---	High	High	High.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
832D2:					
Weller	>60	---	High	High	High.
880B:					
Clinton	>80	---	Moderate	Moderate	Moderate.
880C:					
Clinton	>80	---	Moderate	Moderate	Moderate.
880C2:					
Clinton	>80	---	Moderate	Moderate	Moderate.
880D:					
Clinton	>80	---	Moderate	Moderate	Moderate.
880D2:					
Clinton	>80	---	Moderate	Moderate	Moderate.
977:					
Richwood	>80	---	High	Low	Low.
993D2:					
Gara	>60	---	Moderate	Moderate	Moderate.
Armstrong	>80	---	High	High	Moderate.
994D2:					
Galland	>60	---	High	High	Moderate.
Douds	>80	---	Moderate	Moderate	Moderate.
994E2:					
Galland	>60	---	High	High	Moderate.
Douds	>80	---	Moderate	Moderate	Moderate.
1130:					
Belinda	>60	---	Moderate	High	Moderate.
1260:					
Beckwith	>60	---	Moderate	High	Moderate.
1715:					
Nodaway	>60	---	High	Moderate	Low.
Vesser	>80	---	High	High	Moderate.
Mt. Sterling	>80	---	High	High	Low.
1977:					
Keosauqua	>80	---	Moderate	Low	Moderate.
3051:					
Vesser	>80	---	High	High	Moderate.
3054:					
Zook	>80	---	High	High	Moderate.
3133:					
Colo	>80	---	High	High	Moderate.
3139:					
Perks	>80	---	Low	Low	Moderate.

Table 24.--Soil Features--Continued

Map symbol and soil name	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
	In				
3208:					
Klum	>80	---	Moderate	Low	Low.
3220:					
Nodaway	>60	---	High	Moderate	Low.
3315:					
Nodaway	>80	---	High	Moderate	Low.
Klum	>80	---	Moderate	Low	Low.
Perks	>80	---	Low	Low	Moderate.
3484:					
Lawson	>80	---	High	Moderate	Low.
3520:					
Coppock	>80	---	High	High	Moderate.
3587:					
Chequest	>80	---	High	High	Moderate.
3720:					
Racoon	>80	---	High	High	High.
5010:					
Pits, sand and gravel	>60	---	---	---	---
5020:					
Pits and Dumps	0-4	Hard	---	---	---
5030:					
Pits, limestone quarries	0-4	Hard	---	---	---
5040:					
Orthents	>80	---	---	---	---
5047:					
Aquents	>40	---	---	---	---

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

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.

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.

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

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

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

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope (fig. 19). In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal till. Compact glacial till deposited beneath the ice.

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

Base slope. A geomorphic component of hills (fig. 19) 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).

Beach deposits. Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a post-glacial or glacial lake.

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 (structural). A platformlike, nearly level to gently inclined erosional surface developed in resistant strata in areas where valleys are cut in alternating strong and weak layers that are essentially horizontal.

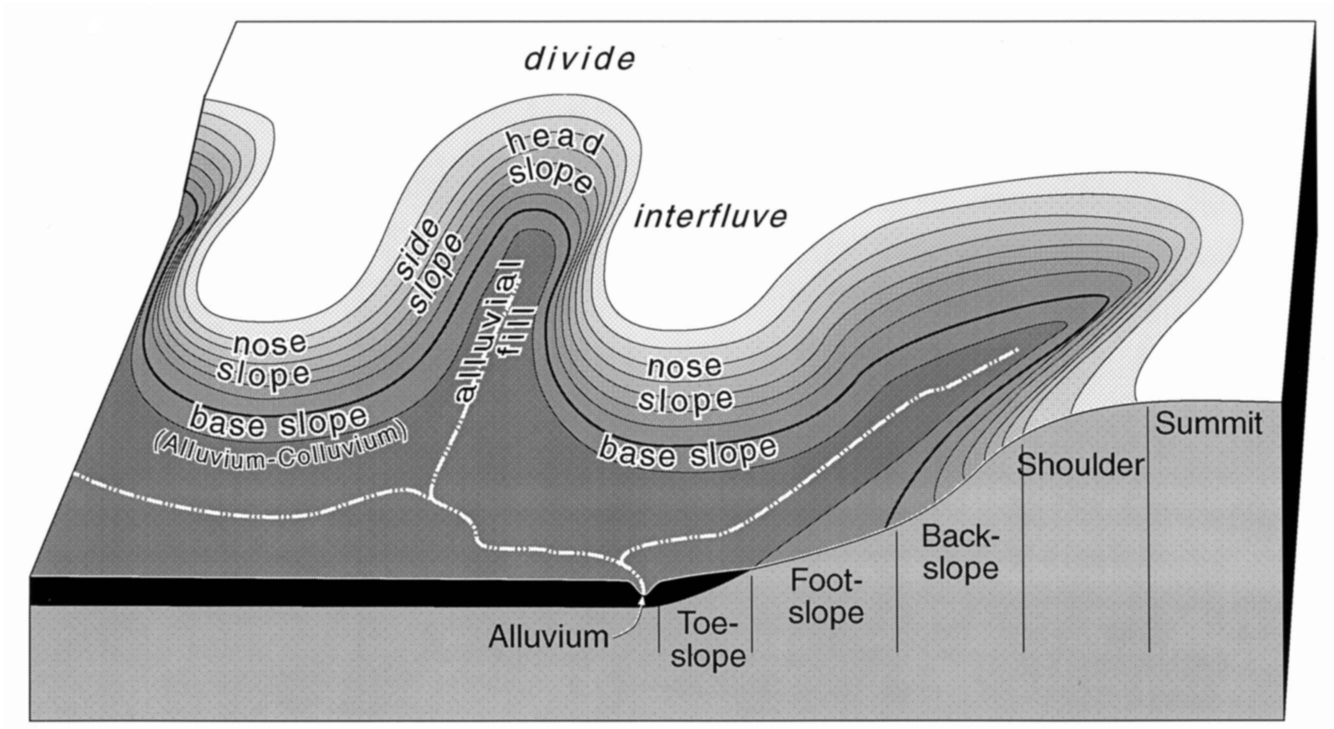

Figure 19.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).

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.

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

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

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

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

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.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

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.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

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

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

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

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.

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

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

Divide. (a) The line of separation, or (b) the summit area, or narrow tract of higher ground that constitutes the watershed boundary between two adjacent drainage basins (fig. 19); it divides the surface waters that flow naturally in one direction from those that flow in the opposite direction.

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.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

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.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

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.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

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

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

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

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

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.

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

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

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 (fig. 19). 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.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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

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

Geomorphology. The science that treats the general configuration of the earth's surface; specifically the study of the classification, description, nature, origin, and development of landforms and their relationships to underlying structures, and the history of geologic changes as recorded by these surface features. The term is especially applied to the genetic interpretation of landforms.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

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

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

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

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

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

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

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

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

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway (fig. 19). 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-chroma zones. Zones having chroma of 3 or more. Typical color in areas of iron concentrations.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

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

O horizon.—An organic layer of fresh and decaying plant residue.

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

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

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

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material.

The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

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

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

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

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Ice-walled lake plain. A relict surface marking the floor of an extinct lake basin that was formed on solid ground and surrounded by stagnant ice in a stable or unstable superglacial environment on stagnation moraines. As the ice melted, the lake plain became perched above the adjacent landscape. The lake plain is well sorted, generally fine textured, stratified deposits.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

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.

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 (fig. 19).

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.

Iron concentrations. High-chroma zones having a high content of iron and manganese oxide because of chemical oxidation and accumulation, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic concentration.

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.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kame moraine. An end moraine that contains numerous kames. A group of kames along the front of a stagnant glacier, commonly comprising the slumped remnants of a formerly continuous outwash plain built up over the foot of rapidly wasting or stagnant ice.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

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

Lake bed. The bottom of a lake; a lake basin.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lakeshore. A narrow strip of land in contact with or bordering a lake; especially the beach of a lake.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

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

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

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

Low-chroma zones. Zones having chroma of 2 or less. Typical color in areas of iron depletions.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

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

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

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 scroll. One of a series of long, parallel, close fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

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

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

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

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

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

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

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

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

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

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

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside (fig. 19). 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

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

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.

Parts per million (ppm). The concentration of a substance in the soil, such as phosphorus or potassium, in one million parts of air-dried soil on a weight per weight basis.

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.

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

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

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

Phosphorus. The amount of phosphorus available to plants at a depth of 30 to 42 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available phosphorus are:

Very low	less than 7.5 ppm
Low	7.5 to 13.0 ppm
Medium	13.0 to 22.5 ppm
High	more than 22.5 ppm

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

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

Pitted outwash plain. An outwash plain marked by many irregular depressions, such as kettles, shallow pits, and potholes, which formed by melting of incorporated ice masses.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

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

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

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

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.

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

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

Potassium. The amount of potassium available to plants at a depth of 12 to 24 inches is expressed in parts per million and based on the weighted average of air-dried soil samples. Terms describing the amount of available potassium are:

Very low	less than 50 ppm
Low	50 to 79 ppm
Medium	79 to 125 ppm
High	more than 125 ppm

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.

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

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.

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

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

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

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

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

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

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 (fig. 19). 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 (fig. 19). The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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

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

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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

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.

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

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

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

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

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

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.

Stagnation moraine. A body of drift released by the melting of a glacier that ceased flowing. Commonly but not always occurs near ice margins; composed of till, ice-contact stratified drift, and small areas of glacial lake sediment. Typical landforms are knob-and-kettle topography, locally including ice-walled lake plains.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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

Stream terrace. A platform or 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 stage 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.

Summit. The topographically highest position of a hillslope (fig. 19). 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.

Swale. A slight depression in the midst of generally level land. A shallow depression in an undulating ground moraine caused by uneven glacial deposition.

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

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field 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 (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lakeshore, or seashore. The term is usually applied to both the relatively flat summit surface (tread), cut or built by stream or wave action, and the steeper descending slope (scarp or riser), graded to a lower base level of erosion.

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

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

Till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

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 (fig. 19). Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

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

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

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.