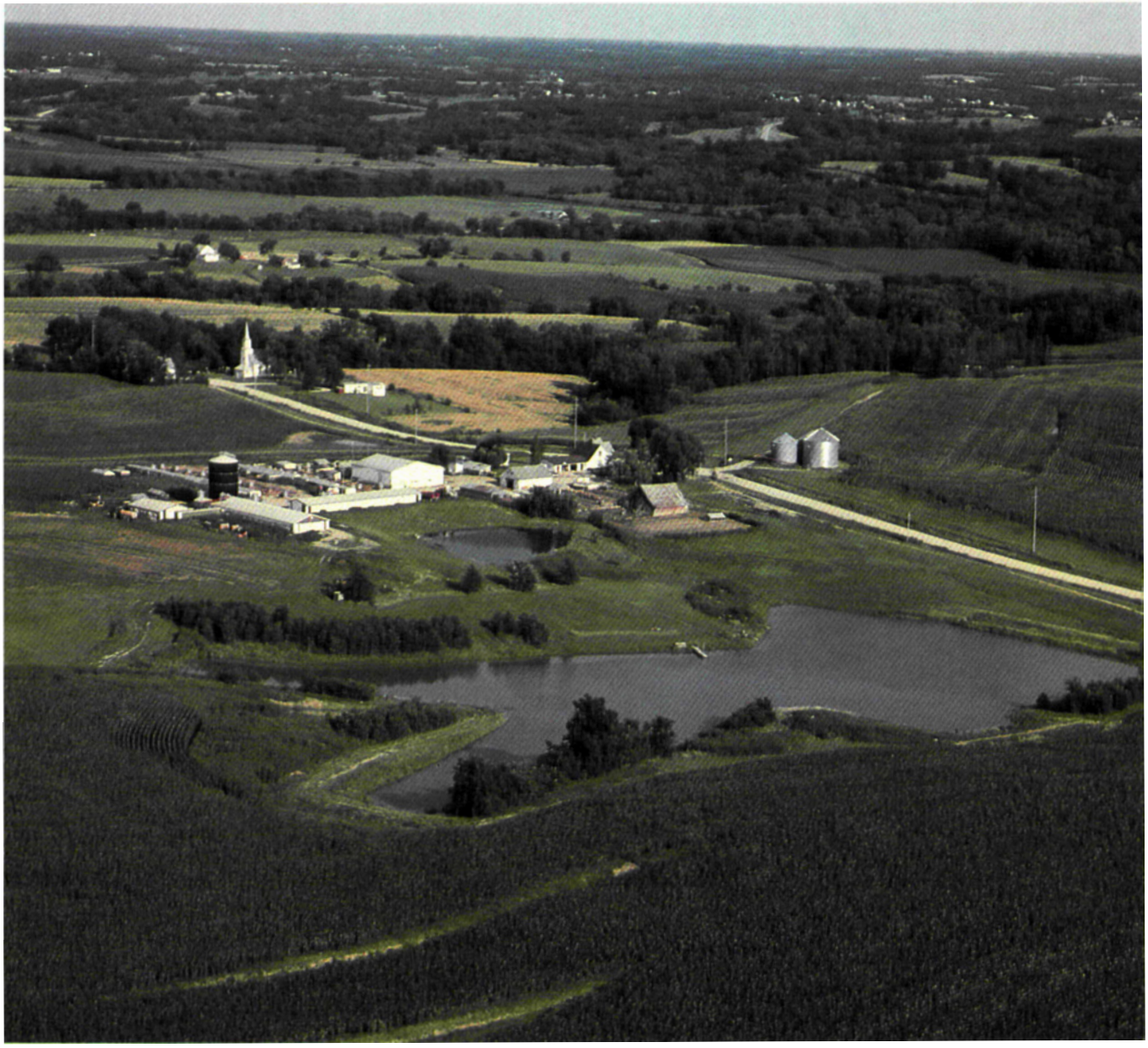
United States Department of Agriculture

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 Jefferson County, Iowa

Part I



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 unit 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 **Index to Map Units** in Part I of this survey, which lists the map units by symbol and name 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. 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 1992. Soil names and descriptions were approved in 1992. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. 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 Jefferson County Soil and Water Conservation District. Funds appropriated by Jefferson County were used to defray part of the cost of the survey.

Cover: Contour farming, erosion-control structures, and terraces are common conservation practices in Jefferson County.

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

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Issued 1999

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Foreword

This soil survey contains information that can be used in land-planning programs in Jefferson County, Iowa. 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. Information on specific uses is given for each soil. 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, Jr.
State Conservationist
Natural Resources Conservation Service

Soil Survey of Jefferson County, Iowa

By John A. Lucassen, Natural Resources Conservation Service

Fieldwork by John R. Allen, Thomas E. Brantmeier, Melvin D. Brown, Leland D. Camp, John A. Lucassen, and Thomas J. O'Connor

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

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 color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, soil 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.

This soil survey updates the survey of Jefferson County published in 1960 (Smith and Riecken, 1960). It provides additional information and has larger maps, which show the soils in greater detail.

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

Jefferson County is in southeastern Iowa (fig. 1). It is bounded on the north by Washington and Keokuk Counties, on the east by Henry County, on the south by Van Buren County, and on the west by Wapello County.

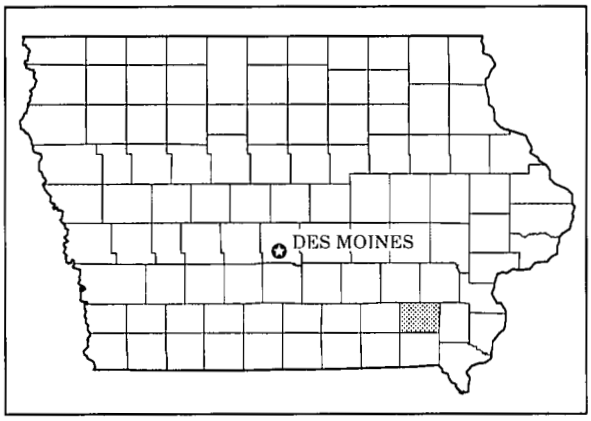

Figure 1.—Location of Jefferson County in Iowa.

History and Development

The area now known as Jefferson County was acquired from France by the United States as a part of the Louisiana Purchase in 1803. The Louisiana Purchase took place during the administration of Thomas Jefferson, the third President of the United States and the namesake of the county (Welty, 1968).

In 1804, the survey area became part of the District of Louisiana, which for administrative purposes was attached to the Territory of Indiana. In 1805, the area became part of the Territory of Louisiana. When the State of Louisiana was admitted into the Union in 1812, the area became part of the Territory of Missouri. When Missouri was admitted into the Union in 1821, the area that is now Jefferson County was part of a territory that received no attention and was left without any form of government for 13 years. It was considered part of the unorganized territory of the United States until 1834. In September 1834, the area became part of the Michigan Territory. It was part of Des Moines County, Michigan. In April 1836, the area became part of the Wisconsin Territory. It was made part of Henry County, Wisconsin, in October 1836. In 1838, the area became part of the Territory of Iowa. Jefferson County, Iowa, was established in March of 1839 (Western Historical Company, 1879).

At the time of the purchase from France, 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 Blackhawk Purchase in 1832, by which Indian lands were ceded following the Blackhawk Wars. On June 1, 1833, the territory of the Blackhawk Purchase was legally opened for white settlement (Western Historical

Company, 1879). The population of Jefferson County grew rapidly from the early settlement until 1870. At that time the population was 17,839. It has remained relatively constant since then. In 1980, the population of Jefferson County was 16,316 (U.S. Department of Commerce, 1980).

Fairfield, the county seat of Jefferson County, is noted for having hosted the first Iowa State Fair, which took place October 25 to 27, 1854 (Western Historical Company, 1879). Fairfield is now the home of the Maharishi International University.

On August 16, 1941, the Jefferson County Soil Conservation District was formed. The first elected commissioners were Roy J. Lamansky, Elmer Davis, and Grant Nelson.

Agriculture is the chief economic enterprise in Jefferson County. It provides a livelihood for farmers as well as those engaged in business, finance, and many related agribusiness activities. Most of the local income is from the sale of livestock and grain.

The most extensively raised livestock in Jefferson County are beef cattle, hogs, and sheep. In 1989, 5,800 head of grain-fed cattle, 133,000 head of market hogs, and 2,800 head of grain-fed lambs were marketed (Skow and Holden, 1990).

Crop production in the county consists of 75,000 acres of corn, 59,800 acres of soybeans, 8,800 acres of oats, 24,600 acres of hay, and 3,000 acres of wheat (Skow and Holden, 1990). The production from these crops is used in livestock rations or sold on the cash grain market.

Farms in Jefferson County have been declining in number and increasing in size. In 1989, the county had 780 farms that covered 262,300 acres. The average farm size is 336 acres (Skow and Holden, 1990).

Transportation Facilities

Two major highways serve Jefferson County. U.S. Highway 34 crosses the county mainly from east to west, and State Highway 1 crosses from north to south. These two highways intersect at Fairfield. Hard-surface county roads connect these highways to all of 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.

Two railroad freight lines pass through Jefferson County. One crosses the extreme northwest corner of the county, and the other crosses through the central part of the county in an east-west direction, passing through Batavia, Fairfield, and Lockridge. Bus service and an airport are available at Fairfield. Motor freight lines service every trading center in the county.

Physiography and Drainage

The highest point of elevation in Jefferson County is approximately 820 feet above sea level. It is located approximately one-fourth mile southeast of Pekin in the far northwest corner of the county. The lowest point of elevation is approximately 580 feet above sea level. It is located at the point where the Skunk River leaves Jefferson County on the eastern edge of the county.

The difference in elevation between the lowlands and adjoining uplands ranges from 140 to 160 feet along the Skunk River and its tributaries in eastern Jefferson County. It ranges from 60 to 120 feet in the western part of the county. Surface elevations gradually increase in an east-west direction across the county.

The relief along the Skunk River, Cedar Creek, Stump Creek, and Lick Creek is characterized by moderately steep and steep slopes rising from the lowlands. The relief near the remaining drainage systems, which are smaller, is characterized by moderately sloping and strongly sloping slopes rising from the lowlands.

The Skunk River and its tributaries drain about 93 percent of Jefferson County. The Des Moines River and its tributaries drain the southwestern part of the county. The drainage area of the Des Moines River and its tributaries is about 7 percent of the county.

Burr Oak Creek, Walnut Creek, Rocky Branch Creek, Turkey Creek, Brush Creek, and Wolf Creek flow eastward into the Skunk River. These tributaries drain about 47 percent of the county.

Cedar Creek and its tributaries flow southeastward into the Skunk River. They drain about 46 percent of the county.

Climate

The three tables at the end of this section give climate data for the survey area as recorded at Fairfield, Iowa, in the period 1961 to 1990.

In winter, the average temperature is 24.6 degrees F and the average daily minimum temperature is 15.7 degrees. The lowest temperature on record, which occurred at Fairfield on January 22, 1930, is -29 degrees. In summer, the average temperature is 74.0 degrees and the average daily maximum temperature is 85.3 degrees. The highest temperature, which occurred at Fairfield on July 15, 1936, is 114 degrees.

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

The total annual precipitation is about 36.01 inches. Of this, about 24.48 inches, or 68 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 4.87 inches at Fairfield on June 13, 1946. Thunderstorms occur on about 49 days each year, and most occur in June.

The average seasonal snowfall is 28.7 inches. The greatest snow depth at any one time during the period of record was 26 inches on February 8, 1979. On an average, 39 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 14 inches on January 3, 1971.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 79 percent. The sun shines 70 percent of the time possible in summer and 51 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 12.9 miles per hour, in March and April.

Temperature and Precipitation

(Recorded in the period 1961-90 at Fairfield, 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
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	30.3	12.1	21.2	59	-18	0	1.12	0.41	1.71	2	7.3
February----	35.6	17.0	26.3	64	-13	1	.97	.50	1.38	3	7.2
March-------	48.4	28.5	38.5	80	2	32	2.48	1.18	3.60	5	4.0
April-------	63.1	40.5	51.8	88	19	148	3.35	1.91	4.63	6	1.3
May---------	74.3	51.2	62.8	92	33	395	4.01	2.48	5.39	7	.0
June--------	83.6	60.5	72.1	97	45	659	3.56	1.85	5.06	6	.0
July--------	87.6	65.1	76.3	101	49	812	5.17	2.21	7.68	7	.0
August------	84.7	62.2	73.5	100	47	725	4.12	2.11	5.88	6	.0
September---	76.6	54.4	65.5	94	34	468	4.27	1.78	6.38	6	.0
October-----	65.1	43.2	54.2	87	23	191	3.02	1.00	4.69	5	.1
November----	49.3	31.3	40.3	73	7	30	2.18	.73	3.36	4	1.8
December----	34.6	18.0	26.3	63	-13	2	1.76	.71	2.65	4	7.0
Yearly:											
Average---	61.1	40.3	50.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	102	-20	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,463	36.01	29.32	42.04	61	28.7

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

Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Fairfield, 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. 22	May 3
2 years in 10 later than--	Apr. 8	Apr. 18	Apr. 9
5 years in 10 later than--	Mar. 31	Apr. 9	Apr. 20
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 22	Oct. 11	Sept. 27
2 years in 10 earlier than--	Oct. 27	Oct. 16	Oct. 2
5 years in 10 earlier than--	Nov. 4	Oct. 25	Oct. 12

Growing Season

(Recorded in the period 1961-90 at Fairfield, 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	201	178	155
8 years in 10	206	185	162
5 years in 10	217	198	174
2 years in 10	228	211	186
1 year in 10	234	217	193

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit 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 unit 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 map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Taintor-Mahaska-Otley Association

Setting

Landform: Uplands
Slope range: 0 to 9 percent

Composition

Percent of survey area: 13
Extent of components in the association (fig. 2):
Taintor and similar soils—40 percent
Mahaska and similar soils—24 percent
Otley and similar soils—8 percent
Soils of minor extent—28 percent

Soil Properties and Qualities

Taintor

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

Mahaska

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Divides, interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope: 0 to 5 percent
Parent material: Loess

Otley

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

Minor Soils

- Kalona and similar soils
- Nira and similar soils
- Clarinda and similar soils
- Shelby and similar soils
- Sperry and similar soils
- Olmitz and similar soils

2. Mahaska-Otley-Nira Association

Setting

Landform: Uplands
Slope range: 0 to 9 percent

Composition

Percent of survey area: 13
Extent of components in the association:
Mahaska and similar soils—31 percent
Otley and similar soils—25 percent
Nira and similar soils—16 percent
Soils of minor extent—28 percent

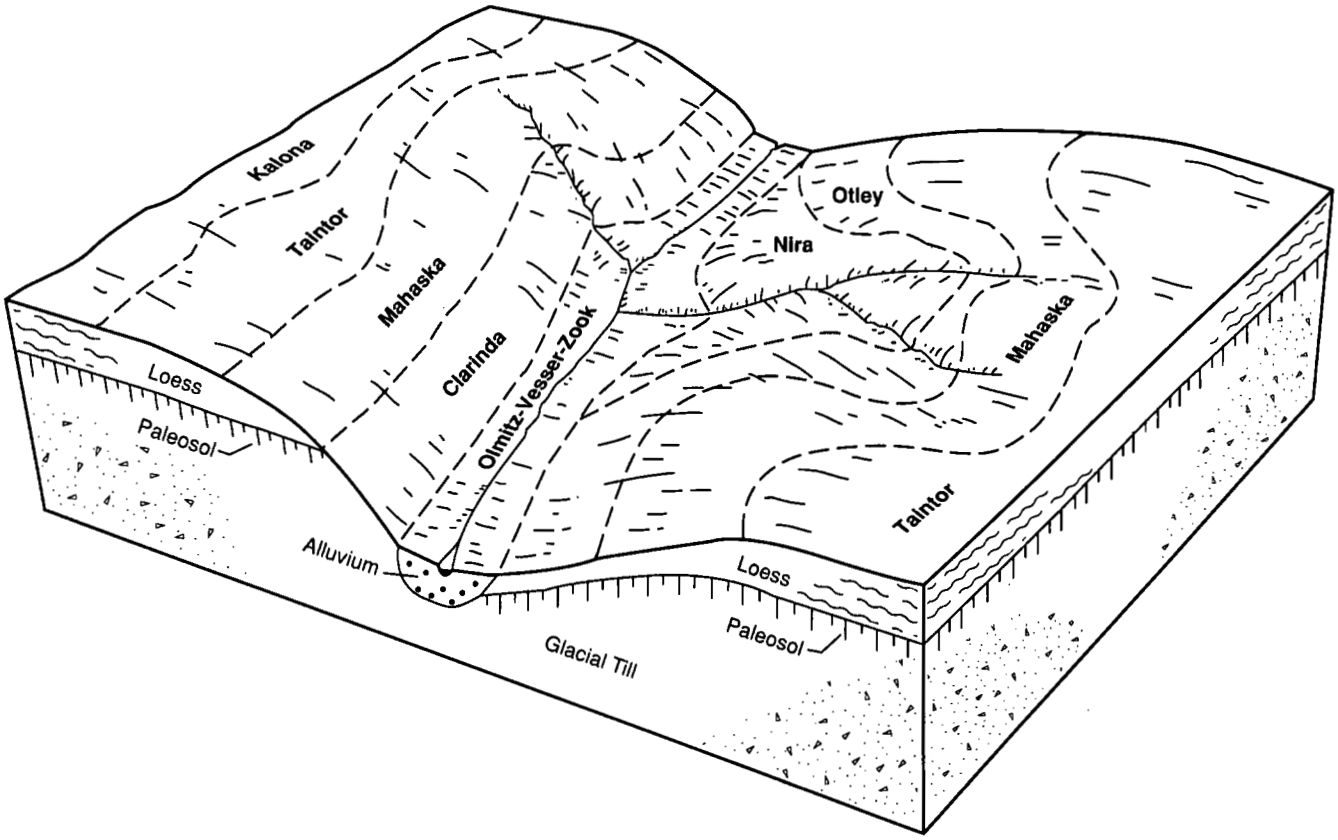

Figure 2.—Typical pattern of soils and parent material in the Taintor-Mahaska-Otley association.

Soil Properties and Qualities

Mahaska

Drainage class: Somewhat poorly drained
Landform: Uplands
Geomorphic component: Divides, interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits and shoulders
Slope: 0 to 5 percent
Parent material: Loess

Otley

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

Nira

Drainage class: Moderately well drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope: 5 to 9 percent
Parent material: Loess

Minor Soils

- Clarinda and similar soils
- Shelby and similar soils
- Gara and similar soils
- Lamoni and similar soils
- Olmitz and similar soils

3. Ladoga-Hedrick-Gara Association

Setting

Landform: Uplands
Slope range: 2 to 18 percent

Composition

Percent of survey area: 16

Extent of components in the association (fig. 3):
Ladoga and similar soils—26 percent
Hedrick and similar soils—13 percent
Gara and similar soils—13 percent
Soils of minor extent—48 percent

Soil Properties and Qualities

Ladoga

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

Hedrick

Drainage class: Moderately well drained
Landform: Uplands
Geomorphic component: Nose slopes, head slopes, and side slopes
Hillslope position: Shoulders and backslopes
Slope: 5 to 14 percent
Parent material: Loess

Gara

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

Minor Soils

- Rinda and similar soils
- Bucknell and similar soils
- Lindley and similar soils
- Olmitz and similar soils
- Givin and similar soils

4. Clinton-Lindley-Ashgrove Association

Setting

Landform: Uplands
Slope range: 2 to 40 percent

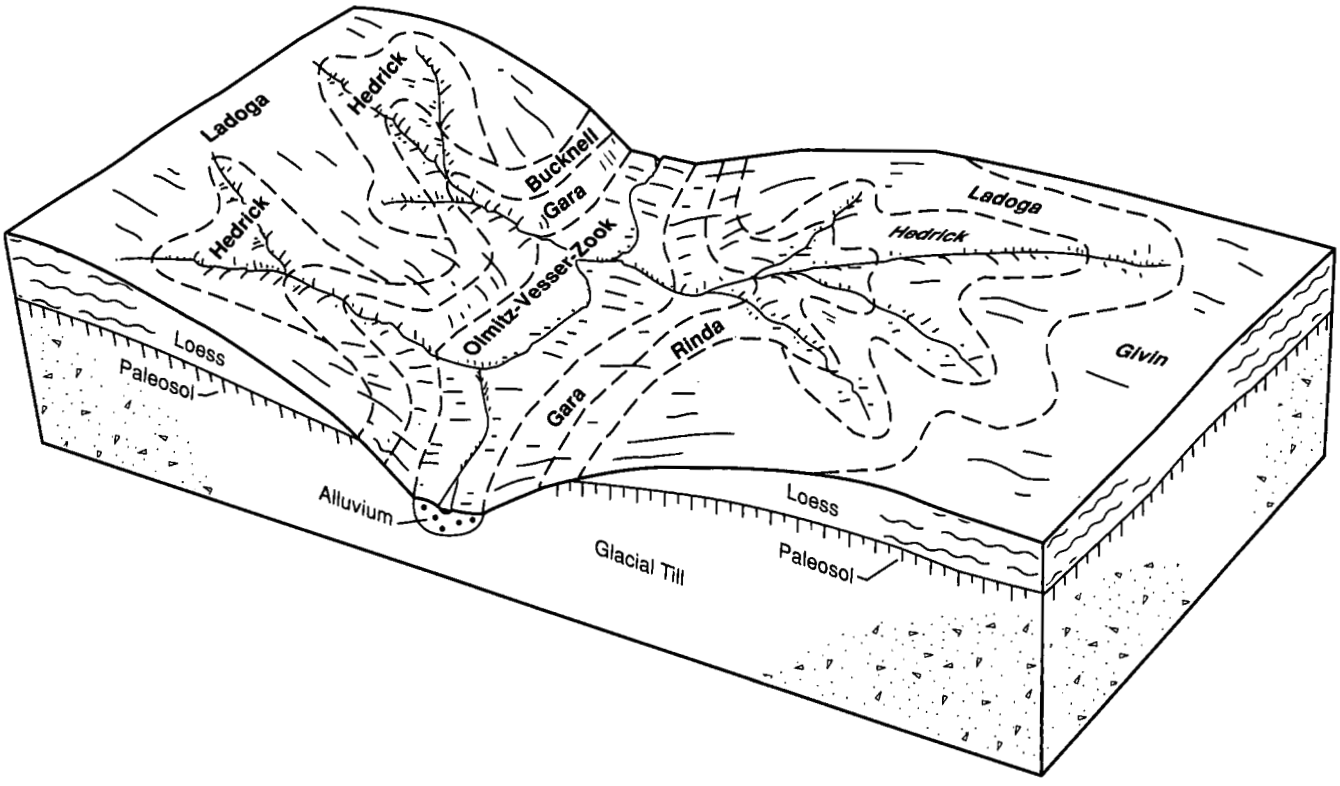

Figure 3.—Typical pattern of soils and parent material in the Ladoga-Hedrick-Gara association.

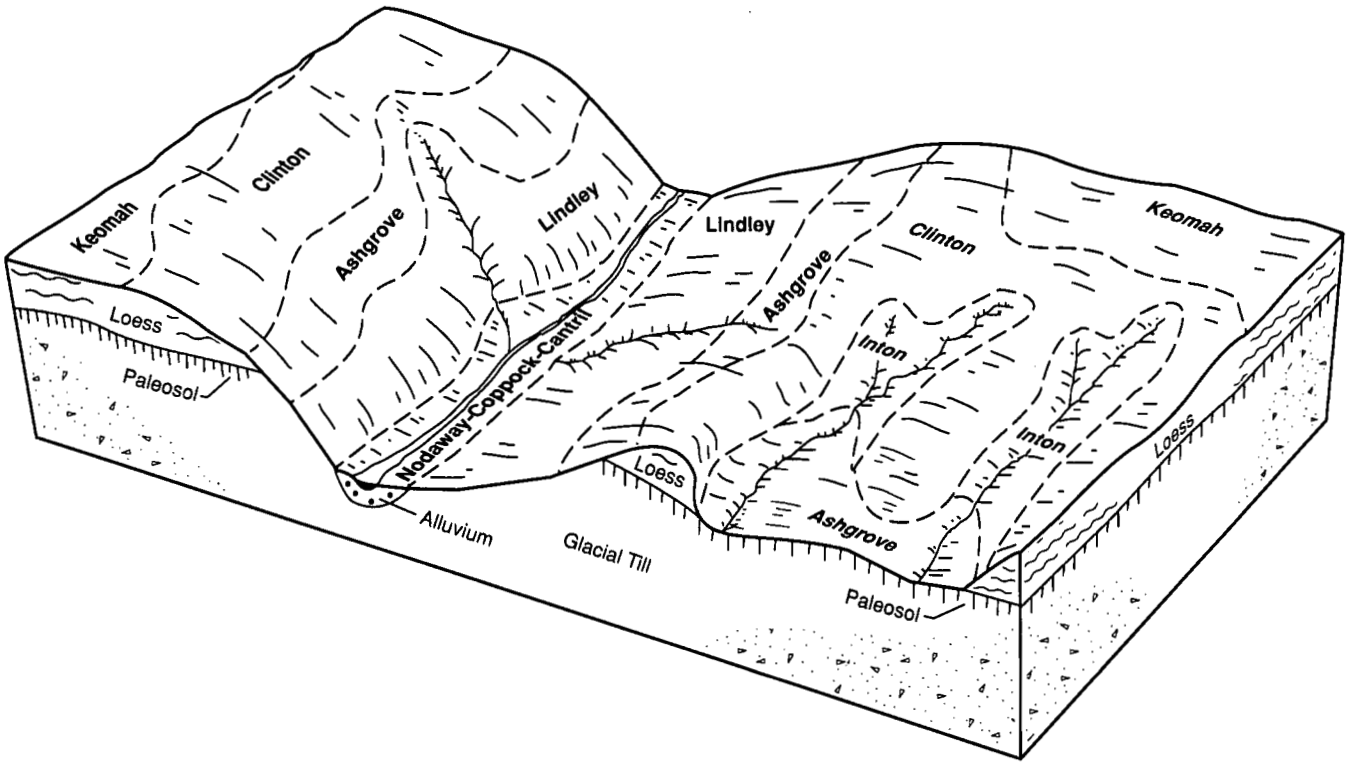

Figure 4.—Typical pattern of soils and parent material in the Clinton-Lindley-Ashgrove association.

Composition

Percent of survey area: 12
Extent of components in the association (fig. 4):
Clinton and similar soils—49 percent
Lindley and similar soils—21 percent
Ashgrove and similar soils—12 percent
Soils of minor extent—18 percent

Soil Properties and Qualities

Clinton

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

Lindley

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

Ashgrove

Drainage class: Poorly drained
Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes and shoulders
Slope: 5 to 14 percent
Parent material: Loess over gray paleosol weathered from glacial till

Minor Soils

- Keswick and similar soils
- Inton and similar soils
- Nodaway and similar soils
- Keomah and similar soils

5. Haig-Grundy-Clarinda Association

Setting

Landform: Uplands
Slope range: 0 to 9 percent

Composition

Percent of survey area: 12
Extent of components in the association (fig. 5):
Haig and similar soils—46 percent
Grundy and similar soils—30 percent
Clarinda and similar soils—14 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Haig

Drainage class: Poorly drained
Landform: Upland flats
Geomorphic component: Divides
Hillslope position: Summits
Slope: 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: 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: 5 to 9 percent
Parent material: Loess over gray paleosol weathered from glacial till

Minor Soils

- Arispe and similar soils
- Rinda and similar soils
- Pershing and similar soils

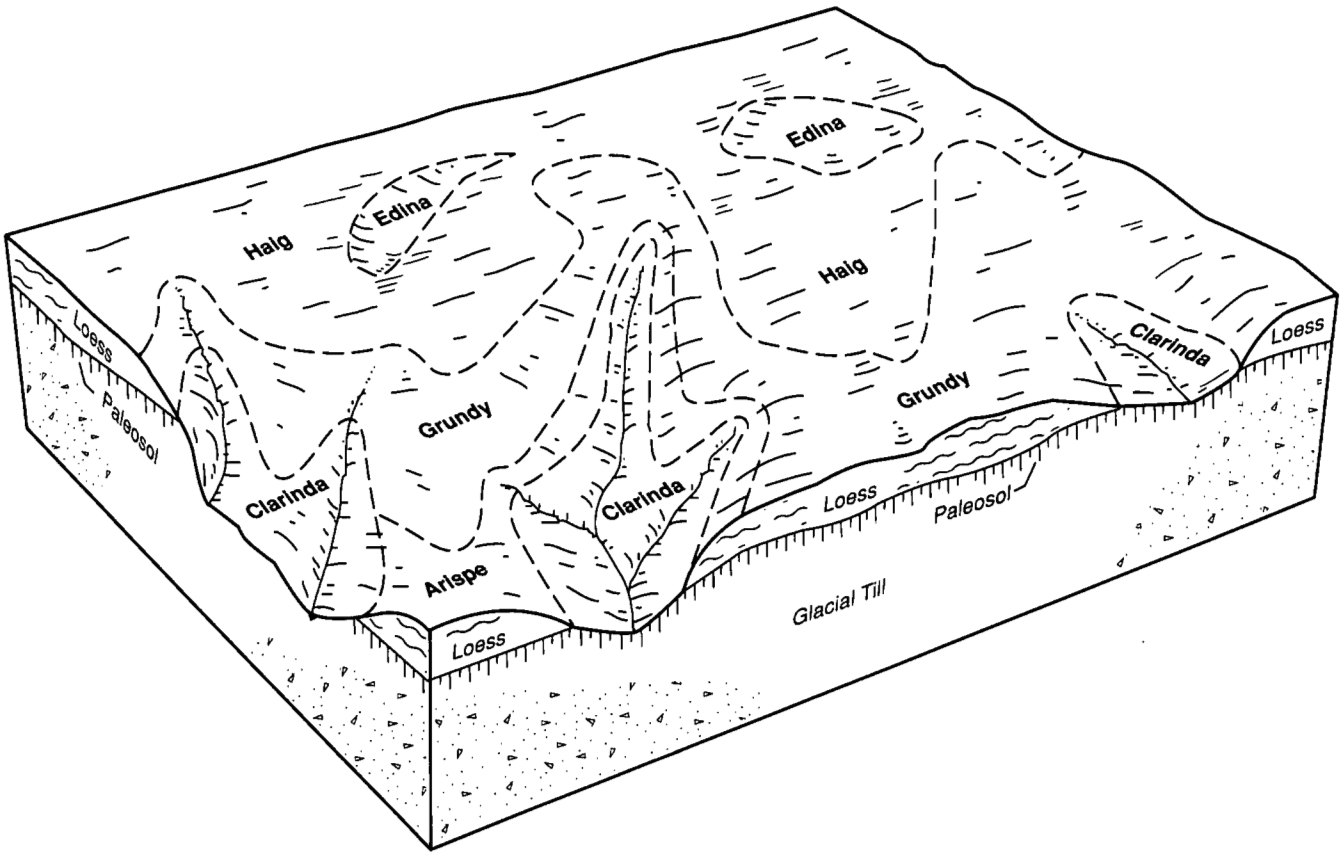

Figure 5.—Typical pattern of soils and parent material in the Haig-Grundy-Clarinda association.

- Olmitz and similar soils
- Edina and similar soils

6. Pershing-Lindley-Rinda Association

Setting

Landform: Uplands
Slope range: 2 to 18 percent

Composition

Percent of survey area: 11
Extent of components in the association:
Pershing and similar soils—35 percent
Lindley and similar soils—17 percent
Rinda and similar soils—14 percent
Soils of minor extent—34 percent

Soil Properties and Qualities

Pershing

Drainage class: Somewhat poorly drained
Landform: Uplands and stream terraces
Geomorphic component: Interfluves, head slopes, nose slopes, and side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope: 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: 9 to 40 percent
Parent material: Glacial till

Rinda

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

Minor Soils

- Bucknell and similar soils
- Olmitz and similar soils
- Ashgrove and similar soils
- Weller and similar soils

7. Weller-Lindley Association

Setting

Landform: Uplands
Slope range: 2 to 40 percent

Composition

Percent of survey area: 15
Extent of components in the association (fig. 6):
Weller and similar soils—43 percent
Lindley and similar soils—25 percent
Soils of minor extent—32 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: 2 to 14 percent
Parent material: Loess

Lindley

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

Minor Soils

- Ashgrove and similar soils
- Pershing and similar soils
- Clinton and similar soils
- Nodaway and similar soils
- Beckwith and similar soils

8. Nodaway-Coppock Association

Setting

Landform: Flood plains
Slope range: 0 to 2 percent

Composition

Percent of survey area: 8
Extent of components in the association:
Nodaway and similar soils—43 percent
Coppock and similar soils—13 percent
Soils of minor extent—44 percent

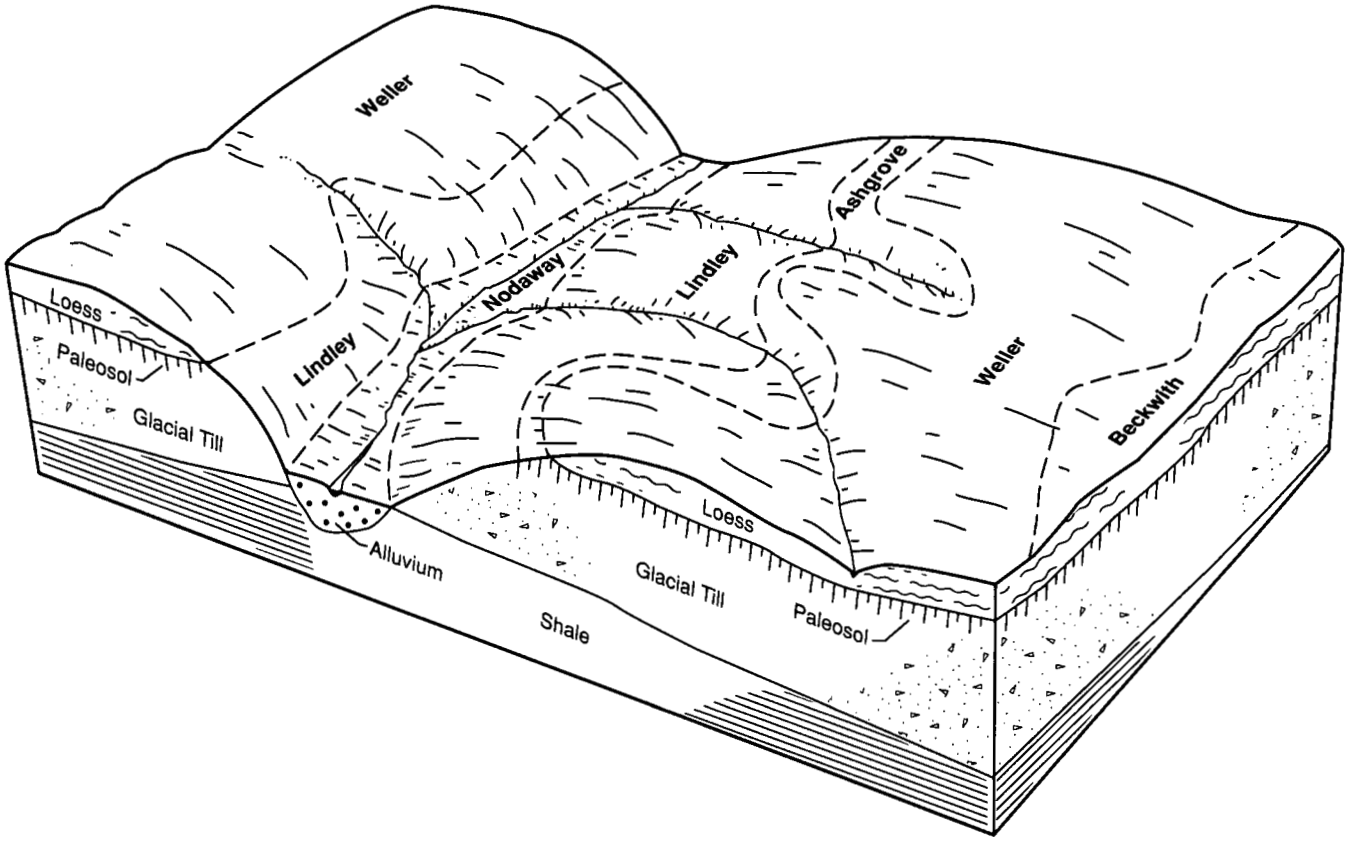

Figure 6.—Typical pattern of soils and parent material in the Weller-Lindley association.

Soil Properties and Qualities

Nodaway

Drainage class: Moderately well drained
Landform: Flood plains
Slope: 0 to 2 percent
Parent material: Silty alluvium

Coppock

Drainage class: Somewhat poorly drained or poorly drained
Landform: Flood plains
Slope: 0 to 2 percent
Parent material: Silty alluvium

Minor Soils

- Vesser and similar soils
- Zook and similar soils
- Klum and similar soils
- Perks and similar soils

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification. The classification and extent of the soils in this survey area are shown in the tables "Classification of the Soils" and "Acreage and Proportionate Extent of the Soils," which are at the end of this section.

Formation of the Soils

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 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 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 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.

Parent Material and Geology

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

Glacial till.—In Jefferson 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 Jefferson County. In some deep road cuts and along some of the major stream valleys, the Aftonian paleosol is below the Kansan glacial till (Kay, 1916; Kay and Apfel, 1929). This paleosol consists mainly of glacial till made up of coarse fragments in a clay loam matrix. The upper part of the till is yellowish brown material that is oxidized and leached. Below this 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, referred to as gumbotil. This gumbotil is several feet thick and is very slowly permeable. Ashgrove, Bucknell, Clarinda, Lamoni, and Rinda soils formed in this paleosol. These soils are extensive throughout Jefferson 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 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 has 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 paleosol consists of loamy sediments over a stone line that, in

turn, is over a highly weathered clayey, reddish brown, acid till. Material that formed in 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 varying textures (Ruhe, 1959). Douds and Galland soils are on low, stepped interfluves above the present drainage system. These soils occur on a landscape that is partly valley fill but merges with the present erosional uplands. The soils are in distinctly higher positions on the landscape than Gara, Shelby, 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 Jefferson County and 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 Jefferson 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 100 inches thick (Schafer, 1955). It is slightly thicker in the northern part of the county, where Otley, Mahaska, and Taintor soils are the dominant soils. In the southern part of the county, Grundy, Haig, Pershing, and Weller soils are the dominant loess soils. Arispe, Beckwith, Belinda, Clinton, Edina, Fayette, Givin, Hedrick, Inton, Kalona, Keomah, Ladoga, Nira, Rubio, and Sperry soils also formed in 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 generally has a high content of sand and gravel.

Alluvium.—Alluvium consists of sediments that have been laid down by water. As the water moved, the sediments were sorted to some extent. 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 Jefferson 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, on bottom land, and along drainageways formed in alluvium. As the river overflows its channel and the water spreads over the flood plains, coarse textured material, such as sand and coarse silt, are deposited first. As the floodwater spreads, it moves more slowly and finer textured sediments are deposited. As the floodwater recedes, the clay particles, which are the finest textured particles, 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. Ainsworth, Chequest, Okaw, Richwood, Tuskeego, and Zook soils are along the Skunk River and Cedar Creek and commonly are away from the meanders of the stream. Zook soils commonly are on the lower part of the bottom land. They are the finest textured soils derived from alluvium in the county.

Ackmore, Coppock, and Vesser soils are along the smaller streams in the county. Coppock and Vesser 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. They commonly contain more sand than the other soils that formed in alluvium. Also, they commonly are in lower positions on the landscape than the surrounding soils that were derived from glacial materials.

Colo soils also formed in local alluvium. The soils that surround the Colo soils formed in loess. In some areas the wind has carried fine sand from the stream channels and the flood plains to higher elevations (Prior, 1976). This sand has been deposited on low stream terraces, high benches, and uplands fringing the leeward side of valleys. Chelsea and Sparta soils formed in eolian sand that is more than 5 feet thick.

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 beds varies widely. Soils that formed in shale residuum in southern Iowa have a wide range of texture, reaction, and other characteristics. Colors of the shale range from nearly black to red, but red,

brown, and grayish colors are dominant. In places, thin beds of sandstone and coal are between layers of shale. 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). Nordness soils are examples of soils that formed in limestone. The limestone beds range from a few inches to several feet in thickness. The thicker beds are good sources of road aggregate and agricultural lime (fig. 7). 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.

Climate

The soils in Jefferson 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 was conducive mainly to the growth of conifers (Lane, 1941).

The influence of the general climate in a region is

Figure 7.—A limestone quarry in an area of Pits, limestone quarries.

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 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.

Vegetation

Many changes in climate and vegetation took place in Iowa during the postglacial period (Lane, 1941; Ruhe, 1956). Spruce grew on the soils from 12,000 to 8,000 years ago, followed by a coniferous-deciduous forest, which lasted until about 6,500 years ago. At that time, grass became the dominant vegetation. For the past 5,000 years, the soils of Jefferson 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 Jefferson County have been studied recently. Evidence shows that the vegetation changed while soils formed in areas bordering trees and grasses. The morphology of Armstrong, Belinda, Bucknell, Cantril, Coppock, Gara, Givin, Hedrick, Ladoga, Pershing, Rinda, Rubio, and Tuskeego soils reflects the influence of both trees and grasses. Trees influenced the formation of Ainsworth, Ashgrove, Beckwith, Chelsea, Clinton, Douds, Fayette, Galland, Gosport, Inton, Keomah, Keswick, Lindley, Nordness, Okaw, and Weller soils (Prill and Riecken, 1958). Grasses influenced the formation of Arispe, Chequest, Clarinda, Colo, Edina, Grundy, Haig, Kalona, Lamoni, Mahaska, Nira, Olmitz, Otley, Richwood, Shelby, Sparta, Sperry, Taintor, Vesser, and Zook soils. Soils that formed under trees are lighter in color and more acid than soils that formed under grasses; also, they have a thinner surface layer. The soils in Jefferson 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.

Relief

Relief indirectly influences soil formation through its effect on drainage. In Jefferson County the slope ranges from level to very steep. In many areas of bottom land, the nearly level soils are occasionally flooded and have a permanently or periodically 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 stream bottoms. 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 nearly the entire county has been modified by geologic processes. Belinda, Haig, Kalona, Taintor, and similar soils, which formed in areas where the water table is high, have a dominantly grayish subsoil. Gavin, Grundy, Mahaska, Pershing, and similar 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 and Taintor soils are examples of soils that 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 Sperry and other soils that are slightly depressional or nearly level. A large amount of water enters the soils and carries the clay particles downward. Sperry 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 to determine the effects of relief on the formation of soils. From the stable slopes to the unstable slopes where these soils occur, tests showed an increase in content of clay in the A horizon and a decrease in thickness of the A horizon. Soil formation is more pronounced on the more stable slopes. In Gara, Lindley, Shelby, and similar soils that have a wide range in slope and are on many different kinds of slopes, the depth to carbonates is shallowest where the slopes are steepest, are convex, or are most unstable.

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. In the steeper areas, material is generally removed before a thick

profile that has 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. Shelby, 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 in which the Arispe, Beckwith, Belinda, Clinton, Haig, Grundy, Kalona, Mahaska, Otley, Nira, Pershing, Taintor, and Weller soils formed. These soils are no more than 14,000 to 16,000 years old, 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 loess and glacial deposits of Iowa. In Jefferson 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 the Edina and Haig soils in Wayne County, Iowa, had radiocarbon ages of 19,000 to 20,000 years.

Human Activities

Important changes take place when the soil is cultivated. Some of these changes have little effect on productivity; others have drastic effects. 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. Fine textured soils that have been plowed when too wet tend to puddle and 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 Taintor and Haig soils on broad flats has been greatly improved because a drainage system has been installed. Deficiencies in plant nutrients have been counteracted in some areas. Some soils are more productive than they were in their natural state because of applications of commercial fertilizer.

Processes of Horizon Differentiation

Horizons are differentiated from each other when four basic kinds of change take place. These are additions, removals, transfers, and transformations (Simonson, 1959). Each of these changes 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 Jefferson 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 formerly was 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 Jefferson 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 soils. It is most common in very clayey soils. It can occur in Clarinda and Zook soils.

Transformations are physical and chemical. The weathering of soil particles to smaller sizes is an example of a 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.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories. 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. The table "Classification of the Soils" in Parts I and II of this publication shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; 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 Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that has an aquic moisture regime).

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

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, montmorillonitic, mesic Typic Haplaquolls.

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.

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
Ackmore	Aeric Fluvaquents, fine-silty, mixed, nonacid, mesic
Ainsworth	Typic Hapludalfs, fine, montmorillonitic, mesic
*Arispe	Aquic Argiudolls, fine, montmorillonitic, mesic
Armstrong	Aquollic Hapludalfs, fine, montmorillonitic, mesic
Ashgrove	Aeric Ochraqualfs, fine, montmorillonitic, mesic, sloping
Beckwith	Typic Albaqualfs, fine, montmorillonitic, mesic
Belinda	Mollic Albaqualfs, fine, montmorillonitic, mesic
Bucknell	Udollic Ochraqualfs, fine, montmorillonitic, mesic, sloping
Cantril	Udollic Ochraqualfs, fine-loamy, mixed, mesic
Chelsea	Alfic Udipsamments, mixed, mesic
Chequest	Typic Haplaquolls, fine, montmorillonitic, mesic
Clarinda	Typic Argiaquolls, fine, montmorillonitic, mesic, sloping
Clinton	Typic Hapludalfs, fine, montmorillonitic, mesic
Colo	Cumulic Haplaquolls, fine-silty, mixed, mesic
Coppock	Mollic Ochraqualfs, fine-silty, mixed, mesic
Douds	Typic Hapludalfs, fine-loamy, mixed, mesic
Edina	Typic Argialbolls, fine, montmorillonitic, mesic
Fayette	Typic Hapludalfs, fine-silty, mixed mesic
Galland	Aquic Hapludalfs, fine, montmorillonitic, mesic
Gara	Mollic Hapludalfs, fine-loamy, mixed, mesic
Givin	Udollic Ochraqualfs, fine, montmorillonitic, mesic
Gosport	Typic Dystrochrepts, fine, illitic, mesic
Grundy	Aquic Argiudolls, fine, montmorillonitic, mesic
Haig	Typic Argiaquolls, fine, montmorillonitic, mesic
Hedrick	Mollic Hapludalfs, fine-silty, mixed, mesic
Inton	Typic Hapludalfs, fine-silty, mixed mesic
Kalona	Typic Haplaquolls, fine, montmorillonitic, mesic
Keomah	Aeric Ochraqualfs, fine, montmorillonitic, mesic
Keswick	Aquic Hapludalfs, fine, montmorillonitic, mesic
Klum	Mollic Udifluvents, coarse-loamy, mixed, nonacid, mesic
Ladoga	Mollic Hapludalfs, fine, montmorillonitic, mesic
*Lamoni	Aquic Argiudolls, fine, montmorillonitic, mesic
Lindley	Typic Hapludalfs, fine-loamy, mixed, mesic
Mahaska	Aquic Argiudolls, fine, montmorillonitic, mesic
*Nira	Typic Hapludolls, fine-silty, mixed, mesic
Nodaway	Mollic Udifluvents, fine-silty, mixed, nonacid, mesic
Nordness	Lithic Hapludalfs, loamy, mixed, mesic
Okaw	Typic Albaqualfs, fine, montmorillonitic, mesic
Olmitz	Cumulic Hapludolls, fine-loamy, mixed, mesic
Orthents	Orthents
Otley	Typic Argiudolls, fine, montmorillonitic, mesic
Perks	Typic Udipsamments, mixed, mesic
Pershing	Aquollic Hapludalfs, fine, montmorillonitic, mesic
Richwood	Typic Argiudolls, fine-silty, mixed, mesic
Rinda	Mollic Ochraqualfs, fine, montmorillonitic, mesic, sloping
Rubio	Mollic Albaqualfs, fine, montmorillonitic, mesic
*Shelby	Typic Argiudolls, fine-loamy, mixed, mesic
Sparta	Entic Hapludolls, sandy, mixed, mesic
Sperry	Typic Argialbolls, fine, montmorillonitic, mesic
Taintor	Typic Argiaquolls, fine, montmorillonitic, mesic
Tuskeego	Mollic Ochraqualfs, fine, montmorillonitic, mesic
Vesser	Argiaquic Argialbolls, fine-silty, mixed, mesic
Weller	Aquic Hapludalfs, fine, montmorillonitic, mesic
Zook	Cumulic Haplaquolls, fine, montmorillonitic, mesic

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
13B	Olmitz-Vesser-Zook complex, 0 to 5 percent slopes	8,290	2.9
23C2	Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded	1,500	0.5
24D2	Shelby clay loam, 9 to 14 percent slopes, moderately eroded	1,780	0.6
41B	Sparta loamy fine sand, 2 to 5 percent slopes	130	*
51	Vesser silt loam, 0 to 2 percent slopes	1,230	0.4
51B	Vesser silt loam, 2 to 5 percent slopes	390	0.1
54	Zook silty clay loam, 0 to 2 percent slopes	810	0.3
65D2	Lindley loam, 9 to 14 percent slopes, moderately eroded	4,240	1.5
65E	Lindley loam, 14 to 18 percent slopes	2,210	0.8
65E2	Lindley loam, 14 to 18 percent slopes, moderately eroded	7,360	2.6
65F2	Lindley loam, 18 to 25 percent slopes, moderately eroded	1,370	0.5
65G	Lindley loam, 25 to 40 percent slopes	7,560	2.7
74	Rubio silt loam, 0 to 2 percent slopes	470	0.2
75	Givin silt loam, 0 to 2 percent slopes	1,600	0.6
75B	Givin silt loam, 2 to 5 percent slopes	3,590	1.3
76B	Ladoga silt loam, 2 to 5 percent slopes	4,190	1.5
76C2	Ladoga silty clay loam, 5 to 9 percent slopes, moderately eroded	8,360	3.0
76D2	Ladoga silty clay loam, 9 to 14 percent slopes, moderately eroded	200	*
80B	Clinton silt loam, 2 to 5 percent slopes	2,160	0.8
80C2	Clinton silty clay loam, 5 to 9 percent slopes, moderately eroded	9,410	3.3
80D2	Clinton silty clay loam, 9 to 14 percent slopes, moderately eroded	3,380	1.2
87B	Colo-Zook complex, 0 to 5 percent slopes	200	*
122	Sperry silt loam, 0 to 1 percent slopes	410	0.1
130	Belinda silt loam, 0 to 2 percent slopes	1,100	0.4
131B	Pershing silt loam, 2 to 5 percent slopes	5,200	1.8
131B2	Pershing silty clay loam, 2 to 5 percent slopes, moderately eroded	320	0.1
131C2	Pershing silty clay loam, 5 to 9 percent slopes, moderately eroded	6,330	2.3
132B	Weller silt loam, 2 to 5 percent slopes	3,190	1.1
132C	Weller silt loam, 5 to 9 percent slopes	430	0.2
132C2	Weller silty clay loam, 5 to 9 percent slopes, moderately eroded	9,140	3.2
132D	Weller silt loam, 9 to 14 percent slopes	280	*
132D2	Weller silty clay loam, 9 to 14 percent slopes, moderately eroded	3,830	1.4
139	Perks loamy sand, 1 to 3 percent slopes	200	*
179D2	Gara clay loam, 9 to 14 percent slopes, moderately eroded	4,350	1.5
179E2	Gara clay loam, 14 to 18 percent slopes, moderately eroded	1,260	0.4
180	Keomah silt loam, 0 to 2 percent slopes	200	*
180B	Keomah silt loam, 2 to 5 percent slopes	410	0.1
208	Klum fine sandy loam, 0 to 2 percent slopes	440	0.2
211	Edina silt loam, depressional, 0 to 1 percent slopes	80	*
220	Nodaway silt loam, 0 to 2 percent slopes	7,320	2.6
222C	Clarinda silty clay loam, 5 to 9 percent slopes	830	0.3
222C2	Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	7,820	2.8
223C2	Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded	10,050	3.6
260	Beckwith silt loam, 0 to 2 percent slopes	530	0.2
263	Okaw silt loam, 0 to 2 percent slopes	250	*
264B	Ainsworth silt loam, 2 to 5 percent slopes	270	*
273B	Olmitz loam, 2 to 5 percent slopes	210	*
279	Taintor silty clay loam, 0 to 2 percent slopes	15,400	5.5
280	Mahaska silty clay loam, 0 to 2 percent slopes	7,390	2.6
280B	Mahaska silty clay loam, 2 to 5 percent slopes	13,450	4.8
281B	Otley silty clay loam, 2 to 5 percent slopes	6,200	2.2
281B2	Otley silty clay loam, 2 to 5 percent slopes, moderately eroded	850	0.3
281C	Otley silty clay loam, 5 to 9 percent slopes	330	0.1
281C2	Otley silty clay loam, 5 to 9 percent slopes, moderately eroded	5,970	2.1
293C	Chelsea-Fayette complex, 5 to 9 percent slopes	260	*
293F	Chelsea-Fayette complex, 18 to 25 percent slopes	430	0.2
313E2	Gosport silty clay loam, 14 to 18 percent slopes, moderately eroded	260	*
313G	Gosport silty clay loam, 25 to 40 percent slopes	350	0.1
315	Nodaway-Klum-Perks complex, 0 to 3 percent slopes	410	0.1
362	Haig silt loam, 0 to 2 percent slopes	14,560	5.2
363	Haig silty clay loam, 0 to 1 percent slopes	350	0.1

See footnote at end of table.

Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
364B	Grundy silty clay loam, 2 to 5 percent slopes	8,520	3.0
364B2	Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded	1,740	0.6
423D2	Bucknell silty clay loam, 9 to 14 percent slopes, moderately eroded	4,750	1.7
424D2	Lindley-Keswick complex, 9 to 14 percent slopes, moderately eroded	1,500	0.5
424E2	Lindley-Keswick complex, 14 to 18 percent slopes, moderately eroded	1,690	0.6
425D	Keswick loam, 9 to 14 percent slopes	450	0.2
425D2	Keswick clay loam, 9 to 14 percent slopes, moderately eroded	1,460	0.5
430	Ackmore silt loam, 0 to 2 percent slopes	660	0.2
453	Tuskeego silt loam, 0 to 2 percent slopes	270	*
499G	Nordness silt loam, 25 to 40 percent slopes	240	*
520	Coppock silt loam, 0 to 2 percent slopes	2,140	0.8
520B	Coppock silt loam, 2 to 5 percent slopes	1,920	0.7
570C2	Nira silty clay loam, 5 to 9 percent slopes, moderately eroded	6,960	2.5
571C2	Hedrick silty clay loam, 5 to 9 percent slopes, moderately eroded	6,240	2.2
572C2	Inton silty clay loam, 5 to 9 percent slopes, moderately eroded	1,270	0.5
572D2	Inton silty clay loam, 9 to 14 percent slopes, moderately eroded	570	0.2
587	Chequest silty clay loam, 0 to 2 percent slopes	890	0.3
594D2	Galland clay loam, 9 to 14 percent slopes, moderately eroded	1,440	0.5
729	Nodaway-Coppock complex, 0 to 2 percent slopes	1,300	0.5
730B	Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes	3,880	1.4
779	Kalona silty clay loam, 0 to 1 percent slopes	1,600	0.6
792C2	Armstrong clay loam, 5 to 9 percent slopes, moderately eroded	200	*
792D2	Armstrong clay loam, 9 to 14 percent slopes, moderately eroded	570	0.2
795C2	Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded	1,280	0.5
795D2	Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded	7,320	2.6
822D2	Lamoni silty clay loam, 9 to 14 percent slopes, moderately eroded	430	0.2
831B	Pershing silt loam, bench, 2 to 5 percent slopes	490	0.2
831C2	Pershing silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	380	0.1
832B	Weller silt loam, bench, 2 to 5 percent slopes	1,110	0.4
832C2	Weller silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	2,030	0.7
832D2	Weller silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	380	0.1
876B	Ladoga silt loam, bench, 2 to 5 percent slopes	200	*
876C2	Ladoga silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	300	0.1
880B	Clinton silt loam, bench, 2 to 5 percent slopes	510	0.2
880C2	Clinton silty clay loam, bench, 5 to 9 percent slopes, moderately eroded	2,070	0.7
880D2	Clinton silty clay loam, bench, 9 to 14 percent slopes, moderately eroded	650	0.2
977	Richwood silt loam, 0 to 2 percent slopes	290	0.1
993D2	Gara-Armstrong complex, 9 to 14 percent slopes, moderately eroded	1,650	0.6
993E2	Gara-Armstrong complex, 14 to 18 percent slopes, moderately eroded	320	0.1
994D2	Galland-Douds complex, 9 to 14 percent slopes, moderately eroded	760	0.3
994E2	Galland-Douds complex, 14 to 18 percent slopes, moderately eroded	900	0.3
1075B	Givin silt loam, bench, 2 to 5 percent slopes	260	*
1130	Belinda silt loam, bench, 0 to 2 percent slopes	220	*
1260	Beckwith silt loam, bench, 0 to 2 percent slopes	270	*
1715	Nodaway-Vesser-Ackmore complex, 0 to 2 percent slopes	7,210	2.6
5020	Pits and Dumps	50	*
5030	Pits, limestone quarries	140	*
5040	Orthents, loamy	160	*
	Water	570	0.2
	Total	281,300	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" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). 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 maps in Part III of 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 or miscellaneous areas. 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, Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded, is a phase of the Arispe series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called soil 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 and Dumps is an example.

The table "Acreage and Proportionate Extent of the Soils" in Parts I and II of this publication gives the acreage and proportionate extent of each map unit. Other tables (see Contents) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Ackmore Series

Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Silty alluvium
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Ackmore silt loam, in an area of Nodaway-Vesser-Ackmore complex, 0 to 2 percent slopes, 1,260 feet south and 1,160 feet east of the northwest corner of sec. 32, T. 73 N., R. 9 W.

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

C—8 to 27 inches; stratified very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) silt loam; massive; friable; few fine roots; slightly acid; clear smooth boundary.

2Ab1—27 to 34 inches; black (10YR 2/1) silty clay loam; common fine distinct brown (10YR 4/3) mottles; weak very fine and fine subangular blocky structure; friable; few fine roots; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

2Ab2—34 to 45 inches; black (10YR 2/1) silty clay loam; common fine distinct brown (10YR 4/3) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine roots; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

2Ab3—45 to 52 inches; very dark gray (10YR 3/1) silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

2Bbg—52 to 60 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine prominent yellowish brown (10YR 5/8 and 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common very dark gray (10YR 3/1) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Depth to 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 5
Chroma—1 or 2
Texture—silt loam

2Ab horizon:
Hue—10YR or neutral
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam or silt loam

2Bbg horizon:
Hue—5Y to neutral

Value—4 or 5
Chroma—0 to 2
Texture—silty clay loam or silt loam

430—Ackmore silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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 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

- Areas that do not have a buried soil

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

Ainsworth Series

Drainage class: Moderately well drained
Permeability: Moderately slow in the upper part and rapid in the lower part
Landform: Stream terraces
Parent material: Local alluvium
Native vegetation: Forest
Slope range: 2 to 5 percent

Typical Pedon

Ainsworth silt loam, 2 to 5 percent slopes, 1,990 feet north and 210 feet west of the southeast corner of sec. 31, T. 72 N., R. 10 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; slightly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many distinct dark brown (10YR 3/3) organic coatings on faces of peds and in pores and few distinct clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—16 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; few fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds and in pores and clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—25 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—33 to 42 inches; yellowish brown (10YR 5/4) silty clay loam; many fine distinct light brownish gray (10YR 6/2) and common prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; abrupt wavy boundary.

2BC—42 to 49 inches; yellowish brown (10YR 5/4) sandy loam; weak fine and medium subangular blocky structure; friable; strongly acid; clear wavy boundary.

2C—49 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grain; friable; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

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

E horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—2 or 3
Texture—silt loam

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

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

2C horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—sand

264B—Ainsworth silt loam, 2 to 5 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Local alluvium
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 8.9 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

- Soils that have a substratum of sandy loam

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

Arispe Series

Drainage class: Somewhat poorly drained
Permeability: 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.

Typical Pedon

Arispe silty clay loam, 5 to 9 percent slopes, moderately eroded, 1,245 feet east and 980 feet north of the southwest corner of sec. 15, T. 71 N., R. 11 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) 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.

Btg1—8 to 13 inches; dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds and very few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; clear smooth boundary.

Btg2—13 to 18 inches; dark grayish brown (10YR

4/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) and few fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and very few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg3—18 to 31 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and few faint very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg4—31 to 42 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) and few fine prominent brown (7.5YR 5/4) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds and few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

BCg—42 to 52 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine prominent yellowish brown (10YR 5/8) and few fine prominent strong brown (7.5YR 4/6 and 5/8) mottles; weak medium prismatic structure; friable; few fine roots; few distinct clay films on faces of peds and few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; clear smooth boundary.

2Bbtg—52 to 60 inches; gray (5Y 5/1) silty clay; few fine prominent strong brown (7.5YR 4/6) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine irregular soft masses of iron-manganese; 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

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—10YR or 2.5Y
Value—4 to 6
Chroma—2 or 3
Texture—silt loam or silty clay loam

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

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

Composition

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

Setting

Landform: Uplands
Geomorphic component: Head slopes, nose slopes, and side slopes
Hillslope position: Shoulders, backslopes, and summits
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.6 inches (high)
Content of organic matter in the surface layer: About 2.7 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

- Areas of severely eroded 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

Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over reddish paleosol weathered from glacial till
Native vegetation: Mixed grasses and deciduous trees
Slope range: 5 to 18 percent

Typical Pedon

Armstrong clay loam, 5 to 9 percent slopes, moderately eroded, 260 feet west and 1,980 feet north of the southeast corner of sec. 25, T. 73 N., R. 10 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) clay loam, brown (10YR 5/3) dry; about 20 percent streaks and pockets of brown (7.5YR 4/4) subsoil material; weak fine granular structure; friable; few fine roots; moderately acid; clear smooth boundary.

Bt1—7 to 11 inches; brown (7.5YR 4/4) clay loam; weak very fine subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and few faint silt coatings on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt2—11 to 19 inches; strong brown (7.5YR 4/6) clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

2Bt3—19 to 23 inches; strong brown (7.5YR 4/6) clay; few fine prominent grayish brown (10YR 5/2) and yellowish red (5YR 4/6) mottles; moderate medium angular blocky structure; firm; few fine roots; stone line in the upper part; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent pebbles; moderately acid; gradual smooth boundary.

2Bt4—23 to 34 inches; strong brown (7.5YR 5/6) clay loam; common fine prominent red (2.5YR 4/6) and few yellowish brown (10YR 5/8) and brown (10YR 5/3) mottles; moderate medium prismatic structure parting to moderate fine angular blocky; firm; few fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; 2 percent pebbles; slightly acid; gradual smooth boundary.

2Bt5—34 to 47 inches; strong brown (7.5YR 5/6) clay loam; common fine prominent grayish brown (10YR 5/2) and distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse prismatic structure parting to moderate fine angular blocky; firm; few fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; 1 percent pebbles; neutral; gradual smooth boundary.

2Bt6—47 to 60 inches; strong brown (7.5YR 5/6) clay loam; few fine prominent grayish brown (10YR 5/2) and common yellowish brown (10YR 5/8) mottles; weak medium and coarse prismatic structure parting to moderate fine angular blocky; firm; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 42 to more than 60 inches

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

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

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

792C2—Armstrong clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Armstrong 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: Backslopes and shoulders
Slope: 5 to 9 percent

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.6 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
- Areas of severely eroded 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

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

Composition

Armstrong 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: 9 to 14 percent

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.6 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
- Areas of severely eroded 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

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

Typical Pedon

Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded, 280 feet east and 1,640 feet south of the center of sec. 35, T. 73 N., R. 9 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 brown (10YR 5/3) subsoil material; weak fine granular structure; friable; few fine roots; moderately acid; abrupt smooth boundary.

BE—5 to 9 inches; brown (10YR 5/3) silty clay loam, pale brown (10YR 6/3) dry; weak thin platy structure; friable; few fine roots; few distinct light gray (10YR 7/2) silt coatings on faces of peds; strongly acid; clear smooth boundary.

2Bt—9 to 18 inches; brown (10YR 4/3) silty clay; common fine distinct gray (10YR 5/1), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very firm; few fine roots; few distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

2Btg1—18 to 30 inches; grayish brown (10YR 5/2) clay; common fine faint gray (10YR 5/1) and distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very firm; few fine roots; few distinct clay films on faces of peds; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Btg2—30 to 37 inches; light gray (5Y 6/1) clay; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very firm; few distinct clay films on faces of peds; 1 percent pebbles; strongly acid; gradual smooth boundary.

2Btg3—37 to 45 inches; light gray (5Y 6/1) clay; many medium and coarse prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; very firm; few distinct clay films on faces of peds; 1 percent pebbles; moderately acid; gradual smooth boundary.

2C—45 to 60 inches; mottled gray (5Y 5/1) and yellowish brown (10YR 5/6 and 5/8) clay loam; massive; very firm; 1 percent pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to 60 inches

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture— silty clay loam

BE horizon:
Hue—10YR
Value—5
Chroma—2 or 3
Texture—silt loam or 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 or silty clay

2C 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: Head slopes, nose slopes, and side slopes
Hillslope position: Backslopes and shoulders
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained

Dominant parent material: Loess over gray paleosol weathered from glacial till
Flooding: None
Seasonal high water table: At the surface to 1 foot below the surface
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 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
- Areas of severely eroded 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over gray paleosol weathered from glacial till
Flooding: None
Seasonal high water table: At the surface to 1 foot below the surface
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 8.2 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

- Lindley and similar soils
- Areas of severely eroded 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

Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands 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, 288 feet north and 1,530 feet west of the center of sec. 29, T. 71 N., R.10 W.

Ap—0 to 5 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; neutral; abrupt smooth boundary.
E—5 to 12 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; moderate medium platy structure parting to moderate thin platy; friable; few fine roots; common distinct silt coatings on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

BE—12 to 15 inches; grayish brown (10YR 5/2) silty clay loam, light gray (10YR 7/2) dry; weak medium platy structure parting to moderate very fine subangular blocky; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores and few silt coatings on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; abrupt wavy boundary.

Btg1—15 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine prominent yellowish brown (10YR 5/4) mottles; strong fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg2—25 to 31 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine prominent yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg3—31 to 40 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and common prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and few distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—40 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and common prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and few distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual wavy boundary.

BCg—47 to 54 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; friable; few fine roots; common distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral; gradual wavy boundary.

Cg—54 to 60 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; massive; friable; common distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 42 to 60 inches

Ap or 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

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

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

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

BCg or Cg horizon:
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: About 95 percent
Inclusions: About 5 percent

Setting

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

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.8 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

- 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

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

Composition

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

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.8 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

- Weller 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

Belinda Series

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, 2,280 feet north and 13 feet west of the southeast corner of sec. 33, T. 71 N., R. 11 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; strongly acid; abrupt smooth boundary.

E—7 to 12 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; few prominent silt coatings on faces of peds; moderately acid; clear smooth boundary.

BE—12 to 15 inches; dark gray (10YR 4/1) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; moderately acid; clear smooth boundary.
Btg1—15 to 23 inches; dark grayish brown (10YR 4/2) silty clay; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; very firm; few fine roots; common prominent clay films on faces of peds; very strongly acid; clear smooth boundary.
Btg2—23 to 32 inches; grayish brown (10YR 5/2) silty clay; common fine prominent yellowish brown (10YR 5/6) and common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; very firm; few fine roots; common prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.
Btg3—32 to 41 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
BCg—41 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak medium and coarse subangular blocky structure; firm; few fine roots; very few prominent organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly 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

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 or 5
Chroma—1 or 2
Texture—silty clay

BCg horizon:
Hue—10YR or 2.5Y
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: About 90 percent
Inclusions: About 10 percent

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.0 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.

Inclusions

- Haig 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

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

Composition

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

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.0 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.

Inclusions

- 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

Bucknell Series

Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Thin mantle of loess or pedisediment and the underlying 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, 640 feet east and 1,100 feet south of the northwest corner of sec. 26, T. 71 N., R. 11 W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; about 20 percent streaks and pockets of dark grayish brown (10YR 4/2) subsoil material; moderate medium subangular blocky structure parting to weak fine granular; friable; few fine roots; neutral; abrupt smooth boundary.

Bt1—6 to 10 inches; dark grayish brown (10YR 4/2) clay; strong medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; few distinct silt coatings on faces of peds; common very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; moderately acid; clear smooth boundary.

Bt2—10 to 16 inches; dark gray (10YR 4/1) and gray (10YR 5/1) clay; few fine prominent strong brown (7.5YR 5/6 and 5/8) and common medium yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; 1 percent pebbles; moderately acid; gradual smooth boundary.

Bt3—16 to 25 inches; mottled yellowish brown (10YR 5/4) and gray (10YR 5/1) clay; moderate medium subangular blocky structure; very firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; 1 percent pebbles; strongly acid; gradual wavy boundary.

Bt4—25 to 32 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; very firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

Bt5—32 to 43 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 5/1) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

BC—43 to 50 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 5/1) clay loam; weak medium and coarse prismatic structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular soft masses of iron-manganese; 1 percent pebbles; moderately acid; gradual smooth boundary.

C—50 to 60 inches; mottled strong brown (7.5YR 5/8), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2) clay loam; massive; firm; few fine irregular soft masses of iron-manganese; 1 percent pebbles; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

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

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

Bt horizon (upper part):
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 8
Texture—clay

Bt horizon (lower part):
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 8
Texture—clay loam

BC or C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 8
Texture—clay loam

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

Composition

Bucknell 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediment over 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 9.3 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

- Gara and similar soils
- Areas of severely eroded 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

Drainage class: Somewhat poorly drained
Permeability: Moderate

Landform: Upland drainageways
Parent material: Local alluvium and colluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 2 to 5 percent

Typical Pedon

Cantril silt loam, in an area of Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes, 890 feet north and 168 feet east of the southwest corner of sec. 19, T. 72 N., R. 8 W.

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

E—9 to 13 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; few fine prominent yellowish brown (10YR 5/8) mottles; weak very fine and fine subangular blocky structure; friable; few fine roots; common prominent light gray (10YR 7/2) silt coatings on faces of peds and in pores; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—13 to 19 inches; dark grayish brown (10YR 4/2) clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate fine subangular blocky structure; firm; few fine roots; few faint clay films in root channels and pores; common prominent light gray (10YR 7/2) silt coatings on faces of peds and in pores; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Bt2—19 to 30 inches; dark grayish brown (10YR 4/2) clay loam; common fine and medium prominent yellowish brown (10YR 5/8) and few fine faint gray (10YR 5/1) mottles; moderate fine subangular blocky structure; firm; few fine roots; few faint clay films in root channels and pores; few prominent light gray (10YR 7/2) silt coatings on faces of peds and in pores; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—30 to 43 inches; dark grayish brown (10YR 4/2) clay loam; many fine and medium prominent yellowish brown (10YR 5/8) and common fine faint gray (10YR 5/1) mottles; moderate fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few light gray (10YR 7/2) silt coatings on faces of peds and in pores; very few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

2C—43 to 60 inches; grayish brown (10YR 5/2) clay loam; many coarse prominent yellowish brown (10YR 5/6) and many fine and medium faint gray (10YR 5/1) mottles; massive; firm; few fine roots; few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; 7 percent pebbles; strongly acid.

Range in Characteristics

Thickness of the solum: 42 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—2
Texture—loam or silt loam

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

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

Chelsea Series

Drainage class: Excessively drained
Permeability: Rapid
Landform: Uplands
Parent material: Eolian sand
Native vegetation: Forest
Slope range: 5 to 25 percent

Typical Pedon

Chelsea loamy fine sand, in an area of Chelsea-Fayette complex, 18 to 25 percent slopes, 2,540 feet

north and 760 feet west of the southeast corner of sec. 12, T. 72 N., R. 8 W.

A1—0 to 2 inches; very dark gray (10YR 3/1) loamy fine sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; few fine to coarse roots; slightly acid; abrupt smooth boundary.
A2—2 to 5 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; single grain; loose; few fine to coarse roots; moderately acid; clear smooth boundary.
E1—5 to 9 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; single grain; loose; few fine to coarse roots; strongly acid; clear smooth boundary.
E2—9 to 16 inches; brown (10YR 4/3) fine sand, light brownish gray (10YR 6/2) dry; single grain; loose; few medium and coarse roots; strongly acid; clear smooth boundary.
E3—16 to 25 inches; dark yellowish brown (10YR 4/4) fine sand, light brownish gray (10YR 6/2) dry; single grain; loose; few fine and medium roots; strongly acid; clear smooth boundary.
E4—25 to 34 inches; yellowish brown (10YR 5/4) fine sand, very pale brown (10YR 7/3) dry; single grain; loose; few fine and medium roots; strongly acid; clear smooth boundary.
E and Bt—34 to 60 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; few fine and medium roots; common brown (7.5YR 4/4) lamellae of loamy sand ½ inch to 2 inches thick; strongly acid.

Range in Characteristics

Thickness of the solum: 48 to more than 60 inches
Special features: Sand is dominantly fine textured. Material as coarse as gravel is lacking to a depth of 40 inches or more.

A horizon:
Hue—10YR
Value—3 or 4
Chroma—1 to 4
Texture—loamy fine sand

E horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture—fine sand or loamy fine sand

E and Bt horizon (E part):
Hue—10YR
Value—4 to 6
Chroma—3 to 6
Texture—fine sand

E and Bt horizon (Bt part):
Total thickness—less than 6 inches in the upper 60 inches of the soil
Hue—7.5YR or 10YR
Value—3 or 4
Chroma—3 or 4
Texture—sandy loam or loamy sand

293C—Chelsea-Fayette complex, 5 to 9 percent slopes

Composition

Chelsea and similar soils: About 70 percent
Fayette and similar soils: About 25 percent
Inclusions: About 5 percent

Setting

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

Component Description

Chelsea

Surface layer texture: Loamy fine sand
Depth to bedrock: Greater than 60 inches
Drainage class: Excessively drained
Dominant parent material: Eolian sand
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 4.5 inches (low)
Content of organic matter in the surface layer: About 0.7 percent (low)

Fayette

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 11.6 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

- Somewhat 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

293F—Chelsea-Fayette complex, 18 to 25 percent slopes

Composition

Chelsea and similar soils: About 70 percent
Fayette and similar soils: About 25 percent
Inclusions: About 5 percent

Setting

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

Component Description

Chelsea

Surface layer texture: Loamy fine sand
Depth to bedrock: Greater than 60 inches
Drainage class: Excessively drained
Dominant parent material: Eolian sand
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 4.5 inches (low)
Content of organic matter in the surface layer: About 0.7 percent (low)

Fayette

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 11.6 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

- Somewhat 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

Chequest Series

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, 1,600 feet south and 900 feet west of the northeast corner of sec. 1, T. 72 N., R. 8 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; strong fine subangular blocky structure; firm; few fine roots; neutral; abrupt smooth boundary.

A—10 to 17 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent brown (7.5YR 4/4) mottles; strong medium subangular blocky structure; firm; few fine roots; very few prominent white (10YR 8/1) silt coatings on faces of peds; slightly acid; gradual smooth boundary.

Btg1—17 to 23 inches; dark gray (10YR 4/1) silty clay loam; few fine prominent brown (7.5YR 4/4)

mottles; strong medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Btg2—23 to 30 inches; dark gray (10YR 4/1) silty clay loam; few fine prominent brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine and medium irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg3—30 to 40 inches; gray (5Y 5/1) silty clay loam; few fine and medium prominent brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine and medium irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg4—40 to 54 inches; light gray (5Y 6/1) silty clay loam; few fine and medium prominent brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; a coarse (2 inches in diameter) very dark gray (10YR 3/1) silty clay loam tubular channel fill (krotovina); few distinct clay films in root channels and pores; slightly acid; gradual smooth boundary.

Cg—54 to 60 inches; mottled light gray (5Y 6/1) and strong brown (7.5YR 4/6) silt loam; massive; friable; few fine roots; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to 60 inches
Thickness of the mollic epipedon: 10 to 18 inches

A horizon:
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 to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silt loam

587—Chequest silty clay loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 10.1 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.

Inclusions

- Vesser and similar soils
- Lighter colored overwash areas

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

Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess over gray paleosol weathered from glacial till

Native vegetation: Prairie
Slope range: 5 to 9 percent
Taxadjunct features: The Clarinda soil in map unit 222C2 does not have a mollic epipedon.

Typical Pedon

Clarinda silty clay loam, 5 to 9 percent slopes, 700 feet south and 1,800 feet west of the northeast corner of sec. 21, T. 73 N., R. 11 W.

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.
A—5 to 12 inches; very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few fine roots; neutral; clear smooth boundary.
2Btg1—12 to 21 inches; dark gray (10YR 4/1) silty clay; moderate fine subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and in pores; common very dark gray (10YR 3/1) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.
2Btg2—21 to 32 inches; dark gray (5Y 4/1) silty clay; many fine prominent strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.
2Btg3—32 to 41 inches; gray (5Y 5/1) silty clay; many fine prominent strong brown (7.5YR 5/6) and common fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.
2Btg4—41 to 60 inches; gray (5Y 5/1) silty clay; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 60 inches or more
Thickness of the mollic epipedon: 10 to 18 inches

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

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

222C—Clarinda silty clay loam, 5 to 9 percent slopes

Composition

Clarinda 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: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over gray paleosol weathered from glacial till
Flooding: None
Seasonal high water table: At the surface to 1 foot below the surface
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 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.

Inclusions

- Adair and similar soils
- Shelby 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

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

Composition

Clarinda and similar soils: About 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over gray paleosol weathered from glacial till
Flooding: None
Seasonal high water table: At the surface to 1 foot below the surface
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 9.3 inches (high)
Content of organic matter in the surface layer: About 2.7 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

- Adair and similar soils
- Shelby and similar soils
- Areas of severely eroded 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

Clinton Series

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

Typical Pedon

Clinton silt loam, 2 to 5 percent slopes, 1,730 feet north and 130 feet west of the southeast corner of sec. 27, T. 73 N., R. 9 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; few mixings of yellowish brown (10YR 5/4) in the lower part; weak thin platy structure parting to weak very fine and fine granular; friable; few fine roots; neutral; abrupt smooth boundary.

E—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak thin platy structure parting to weak very fine subangular blocky; friable; few fine roots; very few distinct silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—10 to 14 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure, platy in the upper part; firm; few fine roots; many prominent clay films on faces of peds and in pores; few faint silt coatings on faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

Bt2—14 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; many distinct light gray (10YR 7/2) silt coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Bt3—22 to 32 inches; yellowish brown (10YR 5/4) silty clay; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—32 to 44 inches; brown (10YR 5/3) silty clay

loam; many fine and medium distinct yellowish brown (10YR 5/6) and many fine faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt5—44 to 55 inches; light brownish gray (10YR 6/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 4/6) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt6—55 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak medium and coarse subangular blocky structure; friable; few faint clay films on faces of peds; moderately acid.

Range in Characteristics

Thickness of the solum: 42 to more than 60 inches

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

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

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

Bt horizon (lower part):
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture—silty clay loam or silty clay

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

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 11.4 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

- Soils that have a lighter colored surface layer
- Somewhat 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

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: Head slopes, nose slopes, side slopes, and interfluves
Hillslope position: Shoulders, backslopes, and summits
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 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
- Areas of severely eroded 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 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
- Areas of severely eroded 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: About 90 percent
Inclusions: About 10 percent

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 11.4 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

- Keomah and similar soils
- Areas of eroded 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 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.4 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.

Inclusions

- Soils that have a sandy and gravelly subsoil
- Galland and similar soils
- Areas of severely eroded 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 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loess over residuum
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 11.4 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.

Inclusions

- Soils that have a sandy and gravelly subsoil
- Galland and similar soils
- Areas of severely eroded 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

Drainage class: Poorly drained
Permeability: Moderate
Landform: Upland drainageways
Parent material: Local alluvium
Native vegetation: Prairie
Slope range: 0 to 5 percent

Typical Pedon

Colo silty clay loam, in an area of Colo-Zook complex, 0 to 5 percent slopes, 1,520 feet east and 135 feet north of the southwest corner of sec. 6, T. 73 N., R. 11 W.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few fine roots; neutral; abrupt smooth boundary.
A1—9 to 22 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; friable; few fine roots; slightly acid; gradual smooth boundary.
A2—22 to 39 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium prismatic structure parting to weak fine subangular blocky; firm; few fine roots; slightly acid; gradual smooth boundary.
Bw—39 to 52 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; weak medium prismatic structure parting to weak fine subangular blocky; firm; few fine roots; moderately acid; gradual smooth boundary.
Cg—52 to 60 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) and many fine distinct brown (10YR 5/3) mottles; massive; firm; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to 60 inches
Thickness of the mollic epipedon: 36 to 48 inches

A horizon:
Hue—10YR to 5Y or neutral
Value—2 or 3
Chroma—0 to 2
Texture—silty clay loam

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

Cg horizon:
Hue—10YR to 5Y
Value—3 to 5

Chroma—1 or 2
Texture—silty clay loam

87B—Colo-Zook complex, 0 to 5 percent slopes

Composition

Colo and similar soils: About 68 percent
Zook and similar soils: About 22 percent
Inclusions: About 10 percent

Setting

Landform: Upland drainageways
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope: 0 to 5 percent

Component Description

Colo

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Local alluvium
Flooding: None
Seasonal high water table: 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 12.1 inches (high)
Content of organic matter in the surface layer: About 6 percent (high)

Zook

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Local alluvium
Flooding: None
Seasonal high water table: 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 9.0 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.

Inclusions

- Clarinda and similar soils
- Soils that have a subsoil of silt loam

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

Drainage class: Somewhat poorly drained or poorly drained
Permeability: Moderate
Landform: Flood plains and drainageways
Parent material: Silty alluvium
Native vegetation: Mixed grasses and deciduous trees
Slope range: 0 to 5 percent

Typical Pedon

Coppock silt loam, 0 to 2 percent slopes, 2,400 feet east and 880 feet south of the northwest corner of sec. 31, T. 72 N., R. 10 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

E1—9 to 17 inches; grayish brown (10YR 5/2) silt loam, light brownish gray (10YR 6/2) dry; few fine faint brown (10YR 5/3) mottles; weak medium platy structure; friable; few fine roots; common prominent white (10YR 8/1) silt coatings on horizontal faces of peds; few fine and medium irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

E2—17 to 24 inches; light brownish gray (10YR 6/2) silt loam, light gray (10YR 7/2) dry; few fine prominent strong brown (7.5YR 5/8) mottles; weak thick platy structure; friable; few fine roots; common prominent white (10YR 8/1) silt coatings on horizontal faces of peds; few fine and medium irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

E3—24 to 29 inches; light brownish gray (10YR 6/2) silt loam; few fine prominent strong brown (7.5YR 5/8) mottles; weak thick platy structure; friable; few fine roots; common prominent white (10YR

8/1) silt coatings on horizontal faces of peds; moderately acid; clear smooth boundary.
Btg1—29 to 34 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; many distinct clay films on faces of peds; very few prominent white (10YR 8/1) silt coatings on faces of peds and in pores; few fine and medium irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg2—34 to 40 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; many distinct clay films on faces of peds; few fine and medium irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg3—40 to 45 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; few fine and medium irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.
Btg4—45 to 53 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; common distinct clay films on faces of peds; few fine and medium irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg5—53 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; few distinct clay films on faces of peds; few fine and medium irregular soft masses of iron-manganese; strongly acid.

Range in Characteristics

Thickness of the solum: 40 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

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

520—Coppock silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 11.7 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

- Soils that have a subsoil of silty clay

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

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty 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 11.7 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

- Soils that have a subsoil of silty clay

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

Drainage class: Moderately well drained
Permeability: Moderate in the upper part and moderately rapid in the lower part
Landform: Stream terraces
Parent material: Old valley alluvium derived from glaciers
Native vegetation: Forest
Slope range: 9 to 18 percent

Typical Pedon

Douds loam, in an area of Galland-Douds complex, 9 to 14 percent slopes, moderately eroded, 1,120 feet north and 2,380 feet east of the southwest corner of sec. 6, T. 71 N., R. 11 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; about 30 percent streaks and pockets of dark yellowish brown (10YR 4/4) subsoil material; moderate 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.

Bt1—8 to 15 inches; dark yellowish brown (10YR 4/4) sandy clay loam; few fine and medium prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—15 to 33 inches; strong brown (7.5YR 4/6) sandy clay loam; common fine and medium prominent yellowish red (5YR 4/6) and very few fine prominent light brownish gray (2.5Y 6/2) mottles; moderate fine subangular blocky structure; firm; few fine roots; thin strata of yellowish brown (10YR 5/4) loamy sand in the lower part; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

BC—33 to 43 inches; stratified, yellowish brown (10YR 5/6) sandy loam, loamy sand, and loam; few fine prominent yellowish red (5YR 4/6) and distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; firm; few fine roots; strongly acid; gradual smooth boundary.

C—43 to 60 inches; strong brown (7.5YR 4/6) sandy loam; many fine distinct yellowish red (5YR 4/6) and common yellowish red (5YR 5/6) mottles; firm; many thick strata of yellowish brown (10YR 5/4) loamy sand; moderately acid.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

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

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

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

Edina Series

Drainage class: Poorly drained
Permeability: Very slow
Landform: Upland depressions
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 1 percent

Typical Pedon

Edina silt loam, depressional, 0 to 1 percent slopes, 620 feet south and 240 feet west of the center of sec. 12, T. 71 N., R. 11 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 16 inches; dark gray (10YR 4/1) silt loam, gray (10YR 5/1) dry; moderate medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; moderately acid; clear smooth boundary.

Bt—16 to 25 inches; very dark gray (10YR 3/1) silty clay, dark gray (10YR 4/1) dry; common fine prominent yellowish brown (10YR 5/6) mottles; moderate very fine and fine angular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; many black (10YR 2/1) organic coatings on faces of peds and in pores; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg1—25 to 37 inches; grayish brown (10YR 5/2) silty clay; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium angular blocky structure; very firm; few fine roots; many clay films on faces of peds; common distinct dark gray (10YR 4/1) organic coatings on faces of peds and in pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Btg2—37 to 47 inches; grayish brown (10YR 5/2) silty clay loam; few fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; very firm; few fine roots; common distinct clay films on faces of peds; very few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine 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; many prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; few fine roots; very few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to more than 60 inches
Thickness of the mollic epipedon: 10 to 14 inches

Ap horizon:
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

Bt horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1
Texture—silty clay or silty clay loam

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

BCg horizon:
Hue—10YR or 2.5Y
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: 0 to 1 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Kind of water table: Apparent
Available water capacity to 60 inches or root-limiting layer: About 9.7 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

Fayette Series

Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess
Native vegetation: Forest
Slope range: 5 to 25 percent

Typical Pedon

Fayette silt loam, in an area of Chelsea-Fayette complex, 5 to 9 percent slopes, 78 feet west and 430 feet north of the southeast corner of sec. 1, T. 72 N., R. 8 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

E—6 to 10 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; common prominent light gray (10YR 7/2) silt coatings on faces of peds; moderately acid; clear smooth boundary.

BE—10 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; common prominent light gray (10YR 7/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—15 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2—28 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3—37 to 46 inches; yellowish brown (10YR 5/4) silty clay loam; common fine prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt4—46 to 57 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few prominent light brownish gray (10YR 6/2) silt coatings in root channels and pores; few fine irregular soft masses of iron-manganese; moderately acid; gradual wavy boundary.

C—57 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

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

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

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

C horizon:
Hue—10YR
Value—4 or 5
Chroma—4
Texture—silt loam or silty clay loam

Galland Series

Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Stream terraces
Parent material: Reddish paleosol weathered from old valley alluvium derived from glaciers
Native vegetation: Forest
Slope range: 9 to 18 percent

Typical Pedon

Galland clay loam, 9 to 14 percent slopes, moderately eroded, 210 feet south and 1,120 feet east of the center of sec. 18, T. 73 N., R. 9 W.

Ap—0 to 7 inches; brown (10YR 4/3) clay loam, light brownish gray (10YR 6/2) dry; about 20 percent streaks and pockets of yellowish brown (10YR 5/4) subsoil material; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

Bt1—7 to 17 inches; yellowish brown (10YR 5/4) clay loam; few fine prominent red (2.5YR 4/6) mottles; moderate fine angular blocky structure; firm; few fine roots; few distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—17 to 28 inches; brown (7.5YR 5/4) clay; few fine prominent grayish brown (10YR 5/2), few fine prominent yellowish brown (10YR 5/6), and many fine prominent red (2.5YR 4/6) mottles; strong medium and coarse angular blocky structure; firm; few fine roots; many prominent reddish brown (5YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Bt3—28 to 37 inches; brown (7.5YR 5/4) clay; few fine prominent dark gray (10YR 4/1), few fine prominent yellowish brown (10YR 5/6), common fine and medium distinct brown (10YR 5/3), and few fine prominent red (2.5YR 4/6) mottles; strong medium and coarse subangular blocky structure; firm; few fine roots; many prominent dark brown (7.5YR 4/4) clay films on faces of peds; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Bt4—37 to 48 inches; yellowish brown (10YR 5/6) clay loam; common fine and medium distinct brown (10YR 5/3) and common fine prominent yellowish red (5YR 4/6) mottles; moderate coarse subangular blocky structure; firm; few fine roots; many prominent dark brown (7.5YR 4/4) clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt5—48 to 54 inches; yellowish brown (10YR 5/6) clay loam; common fine and medium distinct brown (10YR 5/3) and common fine prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

BC—54 to 60 inches; mottled strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2) loam; common fine prominent reddish brown (5YR 5/3) and common medium prominent grayish brown (2.5Y 5/2) mottles; weak coarse subangular blocky structure; firm; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 36 to more than 60 inches

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

E horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—2 or 3
Texture—loam or clay loam

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

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

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

Composition

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

Setting

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

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater 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 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

- Douds and similar soils
- Areas of severely eroded 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

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

Composition

Galland and similar soils: About 70 percent
Douds and similar soils: About 25 percent
Inclusions: About 5 percent

Setting

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

Component Description

Galland

Surface layer texture: Loam
Depth to bedrock: Greater 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 9.9 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Douds

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium derived from glaciers
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 8.7 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

- Areas of severely eroded 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

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

Composition

Galland and similar soils: About 55 percent
Douds and similar soils: About 40 percent
Inclusions: About 5 percent

Setting

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

Component Description

Galland

Surface layer texture: Loam
Depth to bedrock: Greater 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 10.0 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Douds

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Old valley alluvium derived from glaciers
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 8.7 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

- Areas of severely eroded soils

Major Uses of the Unit

- 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

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, 340 feet east and 1,900 feet south of the center of sec. 35, T. 71 N., R. 11 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay loam, grayish brown (2.5Y 5/2) dry; about 20 percent streaks and pockets of brown (10YR 4/3) subsoil material; weak fine granular structure; friable; few fine roots; few distinct white (10YR 8/1) silt coatings on faces of peds and in pores; moderately acid; abrupt smooth boundary.

Bt1—7 to 14 inches; brown (10YR 4/3) clay loam; weak fine subangular blocky structure; friable;

few fine roots between peds; few very dark gray (10YR 3/1) and dark gray (10YR 4/1) organic coatings on faces of peds; few fine pebbles; strongly acid; clear smooth boundary.

Bt2—14 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure parting to moderate fine subangular blocky; firm; few fine roots between peds; common distinct clay films on faces of peds and in pores; few fine pebbles; very strongly acid; gradual smooth boundary.

Bt3—24 to 42 inches; yellowish brown (10YR 5/4) clay loam; common fine and medium distinct yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; firm; few fine roots between peds; common distinct clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; few fine pebbles; strongly acid; gradual smooth boundary.

BC—42 to 47 inches; yellowish brown (10YR 5/4) clay loam; common fine and medium distinct grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine irregular soft masses of iron-manganese; few fine pebbles; strongly acid; gradual smooth boundary.

C—47 to 60 inches; yellowish brown (10YR 5/4) clay loam; many medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; massive; firm; few fine irregular soft masses of iron-manganese; few fine irregular soft masses of carbonate; few fine pebbles; neutral.

Range in Characteristics

Thickness of the solum: 30 to 60 inches
Depth to carbonates: 30 to 60 inches
Content of coarse fragments: 0 to 5 percent fine pebbles below a depth of 7 inches

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

BC or 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: 9 to 14 percent

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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

179E2—Gara clay loam, 14 to 18 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: 14 to 18 percent

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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
- Areas of severely eroded soils

Major Uses of the Unit

- 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 50 percent
Armstrong and similar soils: About 45 percent
Inclusions: About 5 percent

Setting

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

Component Description

Gara

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.6 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

- Bucknell 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

993E2—Gara-Armstrong complex, 14 to 18 percent slopes, moderately eroded

Composition

Gara and similar soils: About 50 percent
Armstrong and similar soils: About 45 percent
Inclusions: About 5 percent

Setting

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

Component Description

Gara

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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

- Bucknell and similar soils

Major Uses of the Unit

- Hayland
- Pasture
- Forest land

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

- Agronomy section
- Forest Land section

Givin Series

Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Upland flats and stream terraces
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 5 percent

Typical Pedon

Givin silt loam, 0 to 2 percent slopes, 700 feet south and 540 feet east of the northwest corner of sec. 21, T. 73 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

E—9 to 14 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to moderate thin platy; friable; few fine roots; many prominent light gray (10YR 7/2) silt coatings on horizontal faces of peds; neutral; clear smooth boundary.

BE—14 to 17 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; few fine roots; common prominent light gray (10YR 7/2) silt coatings on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt1—17 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds;

few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt2—24 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—31 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

BC—41 to 53 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; few fine roots; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

C—53 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; massive; friable; strongly acid (pH 5.2).

Range in Characteristics

Thickness of the solum: 40 to 60 inches

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

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

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

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

75—Givin silt loam, 0 to 2 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: 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: 2 to 4 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 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.

Inclusions

- Rubio 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

75B—Givin silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landform: Upland flats
Geomorphic component: Interfluves
Hillslope position: Shoulders and summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: 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: 2 to 4 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)

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

- Rubio 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

1075B—Givin silt loam, bench, 2 to 5 percent slopes

Composition

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

Setting

Landform: Stream terraces
Geomorphic component: Side slopes
Hillslope position: Summits, shoulders, and backslopes
Slope: 1 to 5 percent

Component Description

Surface layer texture: 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: 2 to 4 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)

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

- Areas of 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

Gosport Series

Drainage class: Moderately well drained
Permeability: Very slow
Landform: Uplands
Parent material: Residuum derived from shale
Native vegetation: Forest
Slope range: 14 to 40 percent

Typical Pedon

Gosport silty clay loam, 14 to 18 percent slopes, moderately eroded, 400 feet west and 2,050 feet

north of the southeast corner of sec. 19, T. 71 N., R. 10 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, yellowish brown (10YR 5/4) dry; about 40 percent streaks and pockets of yellowish brown (10YR 5/4) subsoil material; weak fine subangular blocky structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

Bt—8 to 14 inches; yellowish brown (10YR 5/4) silty clay; few fine distinct strong brown (7.5YR 5/8) and few fine faint yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; very few faint clay films on faces of peds; few fine shale fragments; very strongly acid; clear smooth boundary.

Bw—14 to 22 inches; grayish brown (2.5Y 5/2), yellowish brown (10YR 5/8), and brownish yellow (10YR 6/6) silty clay; weak coarse subangular blocky structure; very firm; few fine roots; few fine shale fragments; very strongly acid; gradual smooth boundary.

Cr—22 inches; weathered clayey shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to material weathered from shale: 3 to 15 inches
Depth to bedrock: 20 to 40 inches

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

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

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

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: 14 to 18 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Residuum derived from 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 2.7 inches (very low)
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

- Areas that have limestone bedrock at the surface

Major Uses of the Unit

- Hayland
- Pasture
- Forest land

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

- Agronomy section
- Forest Land section

313G—Gosport silty clay 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: 18 to 40 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: 20 to 40 inches
Drainage class: Moderately well drained
Dominant parent material: Residuum derived from 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 2.7 inches (very 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

- Areas that have limestone bedrock at 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

Grundy Series

Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Loess
Native vegetation: Prairie
Slope range: 2 to 5 percent
Taxadjunct features: The Grundy soil in map unit 364B2 does not have a mollic epipedon.

Typical Pedon

Grundy silty clay loam, 2 to 5 percent slopes, 1,070 feet east and 87 feet south of the northwest corner of sec. 19, T. 71 N., R. 10 W.

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

A—8 to 15 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to weak fine granular; friable; few fine roots; moderately acid; clear smooth boundary.

BA—15 to 19 inches; dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.

Btg1—19 to 25 inches; dark grayish brown (10YR 4/2) silty clay; common fine distinct yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; common faint very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct manganese or iron-manganese stains; strongly acid; gradual smooth boundary.

Btg2—25 to 33 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent light gray (10YR 6/1) and common fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; common faint very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct manganese or iron-manganese stains; strongly acid; gradual smooth boundary.

Btg3—33 to 42 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent strong brown (7.5YR 5/8) and common fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many prominent clay films on faces of peds; common faint very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct manganese or iron-manganese stains; moderately acid; gradual smooth boundary.

Btg4—42 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/4 and 5/6) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common prominent clay films on faces of peds; common faint very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct manganese or iron-manganese stains; moderately acid; gradual smooth boundary.

Cg—50 to 60 inches; light gray (5Y 6/1) silty clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; massive; firm; common faint very dark gray (10YR 3/1) organic coatings in root channels and pores; few distinct manganese or iron-manganese stains; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 11 to 24 inches

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

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

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 to 3
Texture—silty clay

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

Cg horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

364B—Grundy silty clay loam, 2 to 5 percent slopes

Composition

Grundy 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: Shoulders and summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None
Depth to the water table: 1.5 to 3.0 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 3.5 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

- Haig 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

364B2—Grundy silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

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

Setting

Landform: Uplands
Geomorphic component: Interfluves, side slopes, head slopes, and nose slopes
Hillslope position: Shoulders and summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Loess
Flooding: None

Depth to the water table: 1.5 to 3.0 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 3.2 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

- Haig 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

Haig Series

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, 2,334 feet west and 120 feet north of the southeast corner of sec. 23, T. 71 N., R. 8 W.

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

A1—6 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.

A2—12 to 17 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bt—17 to 22 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; few fine roots; common distinct black (10YR 2/1) clay films on faces of peds; moderately acid; clear smooth boundary.

Btg1—22 to 29 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; strongly acid; gradual smooth boundary.

Btg2—29 to 36 inches; olive gray (5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate fine prismatic; very firm; few fine roots; many distinct clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds and in pores; moderately acid; gradual smooth boundary.

Btg3—36 to 42 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg4—42 to 50 inches; light olive gray (5Y 6/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Btg5—50 to 60 inches; mottled light olive gray (5Y 6/2) and yellowish brown (10YR 5/8) silty clay loam; weak medium prismatic structure; friable; very few distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 52 to more than 60 inches
Thickness of the mollic epipedon: 20 to 23 inches

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

Bt horizon:
Hue—10YR or 2.5Y
Value—3 or 4

Chroma—1
Texture—silty clay loam or silty clay

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1
Texture—silty clay

Btg horizon (lower part):
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay or silty clay loam

362—Haig silt loam, 0 to 2 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 11.0 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.

Inclusions

- Edina 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

363—Haig silty clay loam, 0 to 1 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.9 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.

Inclusions

- Edina 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

Hedrick Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Uplands
Parent material: Deoxidized loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 5 to 9 percent

Typical Pedon

Hedrick silty clay loam, 5 to 9 percent slopes, moderately eroded, 600 feet west and 740 feet north of the center of sec. 23, T. 73 N., R. 9 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; about 20 percent streaks and pockets of brown (10YR 4/3) subsoil material; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

BE—7 to 13 inches; brown (10YR 4/3) silty clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bt1—13 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; clear smooth boundary.

Bt2—18 to 23 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) silty clay loam; common fine prominent yellowish brown (10YR 5/8) and common fine distinct grayish brown (10YR 5/2) mottles; moderate fine angular blocky structure; friable; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Bt3—23 to 34 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium angular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—34 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/4 and 5/8) and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine and medium angular blocky structure; firm; few fine roots; common faint clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt5—42 to 56 inches; light brownish gray (2.5Y 6/2) silt loam; common fine prominent dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) mottles; weak fine and medium prismatic structure; firm; few fine roots; few faint clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

BC—56 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; common fine prominent dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; friable; few fine roots; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 46 to 60 inches

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

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

Bt horizon (upper part):
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay loam

Bt horizon (lower part):
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam or silt loam

BC horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam or silt loam

571C2—Hedrick silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Deoxidized 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 11.6 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

- Rinda and similar soils
- Areas of severely eroded 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

Inton Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Uplands
Parent material: Deoxidized loess
Native vegetation: Forest
Slope range: 5 to 14 percent

Typical Pedon

Inton silty clay loam, 5 to 9 percent slopes, moderately eroded, 1,180 feet east and 1,160 feet north of the southwest corner of sec. 10, T. 72 N., R. 11 W.

Ap—0 to 7 inches; brown (10YR 4/3) silty clay loam, light brownish gray (10YR 6/2) dry; about 20 percent streaks and pockets of dark yellowish brown (10YR 4/4) subsoil material; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Bt1—7 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine and medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

Bt2—15 to 39 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; moderately acid; clear smooth boundary.

BC—39 to 48 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; friable; few fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

C—48 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) and common fine prominent dark yellowish brown (10YR 4/6) mottles; massive; friable; few fine roots; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 30 to 50 inches

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

Bt horizon (upper part):
Hue—10YR
Value—4 or 5

Chroma—3 or 4
Texture—silty clay loam

Bt horizon (lower part):
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam

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

572C2—Inton silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Deoxidized 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 11.5 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
- Areas of severely eroded 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

572D2—Inton silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Inton 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Deoxidized 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 11.5 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
- Areas of severely eroded 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

Kalona Series

Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Upland flats
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 1 percent

Typical Pedon

Kalona silty clay loam, 0 to 1 percent slopes, 1,092 feet north and 320 feet east of the southwest corner of sec. 12, T. 73 N., R. 11 W.

Ap—0 to 9 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

A—9 to 15 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; few fine roots; neutral; gradual smooth boundary.

AB—15 to 20 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; few fine prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct black (10YR 2/1) organic coatings on faces of peds; few fine and medium irregular wormcasts; neutral; clear smooth boundary.

Bg1—20 to 25 inches; dark gray (5Y 4/1) silty clay; few fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

Bg2—25 to 35 inches; gray (5Y 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6), few fine prominent strong brown (7.5YR 5/6), and few fine faint olive gray (5Y 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; very few distinct dark gray (5Y 4/1) organic coatings on faces of peds; slightly acid; gradual smooth boundary.

Bg3—35 to 41 inches; gray (5Y 5/1) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; slightly acid; clear smooth boundary.

BCg—41 to 50 inches; olive gray (5Y 5/2) silty clay loam; many fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure; friable; few fine roots; large very dark gray (10YR 3/1) channel fill or krotovina at a depth of 45 inches; few fine rounded calcium carbonate concretions; slightly alkaline; gradual smooth boundary.

Cg—50 to 60 inches; olive gray (5Y 5/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine roots; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 12 to 24 inches

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

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

Bg horizon:
Hue—10YR to 5Y
Value—4 or 5
Chroma—1 or 2
Texture—silty clay or silty clay loam

BCg or Cg horizon:
Hue—5Y
Value—4 or 5
Chroma—1 or 2
Texture—silt loam or silty clay loam

779—Kalona silty clay loam, 0 to 1 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.8 inches (high)
Content of organic matter in the surface layer: About 5.5 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

- Sperry 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

Keomah Series

Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Upland flats
Parent material: Loess
Native vegetation: Forest
Slope range: 0 to 5 percent

Typical Pedon

Keomah silt loam, 0 to 2 percent slopes, 1,220 feet west and 120 feet south of the center of sec. 16, T. 73 N., R. 8 W.

Ap—0 to 8 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; weak very fine and fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

E—8 to 14 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; moderate medium platy structure parting to moderate very fine subangular blocky; friable; few fine roots; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

BE—14 to 18 inches; grayish brown (10YR 5/2) and brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate very fine subangular blocky; friable; few fine roots; few fine irregular soft masses of iron-manganese; very strongly acid; clear smooth boundary.

Bt1—18 to 28 inches; brown (10YR 5/3) silty clay; common fine distinct yellowish brown (10YR 5/6) and few fine faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Bt2—28 to 47 inches; grayish brown (10YR 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; very few very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

C—47 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/8) and many fine prominent yellowish brown (10YR 5/6) mottles; massive; friable; few fine roots; few very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine 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
Chroma—1 or 2
Texture—silt loam

E horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam

BE horizon:
Hue—10YR
Value—4 or 5
Chroma—2 or 3

Texture—silty clay loam

2Bt horizon (upper part):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay

2Bt horizon (lower part):
Hue—10YR to 5Y
Value—4 or 5
Chroma—2 or 3
Texture—silty clay loam

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

180—Keomah silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Uplands
Geomorphic component: Divides
Hillslope position: Summits
Slope: 0 to 2 percent

Component Description

Surface layer texture: 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: 2 to 4 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 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

- Rubio 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

180B—Keomah silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Shoulders and summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: 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: 2 to 4 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.

Inclusions

- Rubio 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

Keswick Series

Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over reddish paleosol weathered from glacial till
Native vegetation: Forest
Slope range: 9 to 18 percent

Typical Pedon

Keswick loam, 9 to 14 percent slopes, 1,760 feet north and 140 feet west of the center of sec. 19, T. 71 N., R. 11 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine and medium roots; moderately acid; clear wavy boundary.

E—4 to 8 inches; brown (10YR 5/3) loam, pale brown (10YR 6/3) dry; few fine faint yellowish brown (10YR 5/4) mottles; weak thin and medium platy structure; friable; few fine and medium roots; very few distinct white (10YR 8/1) silt coatings on faces of peds; strongly acid; gradual wavy boundary.

BE—8 to 12 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; few fine and medium roots; very few distinct white (10YR 8/1) silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

2Bt1—12 to 17 inches; strong brown (7.5YR 5/6) clay loam; few fine distinct yellowish red (5YR 4/6) and prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

2Bt2—17 to 24 inches; strong brown (7.5YR 4/6) clay; many medium distinct yellowish red (5YR 5/6), common fine prominent grayish brown (10YR 5/2), and few prominent dark red (2.5YR 3/6) mottles; strong medium subangular blocky structure; very firm; few fine and medium roots; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

2Bt3—24 to 31 inches; yellowish red (5YR 4/6) clay; many medium distinct strong brown (7.5YR 4/6), common fine prominent grayish brown (10YR 5/2), and few dark red (2.5YR 3/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine and medium roots; many distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

2Bt4—31 to 39 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; few fine and medium roots; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

2Bt5—39 to 52 inches; yellowish brown (10YR 5/6) clay loam; common fine prominent grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; firm; few fine and medium roots; few distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

2BC—52 to 60 inches; mottled yellowish brown (10YR 5/4), brown (7.5YR 5/2), and strong brown (7.5YR 5/6) clay loam; weak medium prismatic structure; firm; few distinct clay films on faces of peds; very strongly acid.

Range in Characteristics

Thickness of the solum: 42 to more than 60 inches
Depth to carbonates: 42 to more than 60 inches

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

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

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

2Bt horizon (upper part):
Hue—5YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—clay loam or clay

2Bt horizon (lower part):
Hue—7.5YR to 5Y

Value—4 or 5
Chroma—1 to 6
Texture—clay loam or clay

2BC horizon:
Hue—7.5YR to 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: 9 to 14 percent

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.9 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
- Areas of eroded 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: 9 to 14 percent

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.8 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

- Lindley and similar soils
- Areas of severely eroded 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

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 2 percent

Typical Pedon

Klum fine sandy loam, 0 to 2 percent slopes, 1,300 feet south and 1,140 feet west of the northeast corner of sec. 5, T. 72 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.

C1—9 to 20 inches; stratified dark brown (10YR 3/3) and grayish brown (10YR 5/2) sandy loam; massive with horizontal cleavage planes; friable; common very fine and fine roots; moderately acid; gradual smooth boundary.

C2—20 to 30 inches; stratified brown (10YR 4/3) and grayish brown (10YR 5/2) loamy fine sand and silt loam; massive with horizontal cleavage planes; friable; common very fine and fine roots; moderately acid; gradual smooth boundary.

C3—30 to 43 inches; stratified very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), brown (10YR 4/3), and grayish brown (10YR 5/2) loamy fine sand and silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive with horizontal cleavage planes; friable; moderately acid; gradual smooth boundary.

C4—43 to 60 inches; stratified brown (10YR 4/3), olive gray (5Y 4/2), and dark brown (10YR 3/3) loamy fine sand and silt loam; common fine prominent reddish brown (5YR 4/4) and common fine distinct olive gray (5Y 5/2) mottles; massive; friable; slightly acid.

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 to 2.5Y
Value—3 to 5
Chroma—2 to 8
Texture—loamy sand, fine sandy loam, sandy loam, silt loam, loam, or loamy fine sand

208—Klum fine sandy loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Fine sandy loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Frequency of flooding: 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 9.5 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

- Soils that have a substratum of silty clay

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

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

- Agronomy section

Ladoga Series

Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Uplands and stream terraces
Parent material: Loess
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 2 to 14 percent

Typical Pedon

Ladoga silt loam, 2 to 5 percent slopes, 125 feet south and 70 feet west of the northeast corner of sec. 6, T. 72 N., R. 11 W.

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

E—8 to 13 inches; brown (10YR 4/3) and dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine subangular blocky structure parting to weak very thin platy; friable; few fine roots; very few distinct light gray (10YR 7/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—13 to 20 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; slightly acid; gradual smooth boundary.

Bt2—20 to 25 inches; dark yellowish brown (10YR 4/4) silty clay; moderate fine subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt3—25 to 32 inches; brown (10YR 5/3) silty clay loam; common fine distinct strong brown (7.5YR 5/6) and brown (7.5YR 4/4) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; very firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

Bt4—32 to 45 inches; brown (10YR 5/3) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; very firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt5—45 to 54 inches; grayish brown (10YR 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) mottles; weak fine and medium prismatic structure parting to weak fine and medium subangular blocky; firm; few fine roots; few distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

C—54 to 60 inches; grayish brown (10YR 5/2) silt loam; common fine and medium prominent strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few fine roots; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

Ap horizon:
Hue—10YR
Value—2 or 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

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

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

C horizon:
Hue—10YR
Value—5
Chroma—2 to 4
Texture—silt loam

76B—Ladoga silt loam, 2 to 5 percent slopes

Composition

Ladoga 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 summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 11.9 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.

Inclusions

- Areas of eroded soils
- Somewhat 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

76C2—Ladoga silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Ladoga 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 and shoulders
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.8 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

- Bucknell and similar soils
- Areas of severely eroded 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

76D2—Ladoga silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

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

Setting

Landform: Uplands

Geomorphic component: Side slopes, nose slopes, and head slopes
Hillslope position: Backslopes
Slope: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.8 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

- Bucknell and similar soils
- Areas of severely eroded 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

876B—Ladoga silt loam, bench, 2 to 5 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 11.9 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.

Inclusions

- Areas of eroded 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

876C2—Ladoga silty clay loam, bench, 5 to 9 percent slopes, moderately eroded

Composition

Ladoga and similar soils: About 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.8 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

- Soils that have a sandy and gravelly subsoil
- Galland and similar soils
- Areas of severely eroded soils
- Givin 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

Lamoni Series

Drainage class: Somewhat poorly drained
Permeability: Slow
Landform: Uplands
Parent material: Pedisediments over gray paleosol weathered from glacial till
Native vegetation: Prairie
Slope range: 9 to 14 percent
Taxadjunct features: The Lamoni soils in this county do not have a mollic epipedon.

Typical Pedon

Lamoni silty clay loam, 9 to 14 percent slopes, moderately eroded, 1,490 feet east and 600 feet north of the center of sec. 12, T. 72 N., R. 10 W.

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

BA—7 to 12 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; firm; few fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; moderately acid; clear smooth boundary.

2Btg1—12 to 17 inches; dark grayish brown (10YR 4/2) clay; many fine distinct gray (10YR 5/1), few fine prominent yellowish brown (10YR 5/8), and few fine prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; very firm; few fine roots; very few faint clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; moderately acid; gradual smooth boundary.

2Btg2—17 to 24 inches; gray (10YR 5/1) clay; many fine distinct yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/8) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; moderately acid; gradual smooth boundary.

2Btg3—24 to 31 inches; gray (10YR 5/1) clay; common fine and medium distinct yellowish brown (10YR 5/4) and few fine prominent red (2.5YR 4/8) mottles; weak medium and coarse subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; moderately acid; gradual smooth boundary.

2Btg4—31 to 42 inches; light gray (10YR 6/1) clay loam; many medium distinct yellowish brown (10YR 5/4) and common medium and coarse prominent yellowish brown (10YR 5/8) mottles; weak medium and coarse subangular blocky structure; firm; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; neutral; gradual smooth boundary.

2Btg5—42 to 52 inches; light gray (10YR 6/1) clay loam; common medium and coarse distinct yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/8) mottles; weak medium and coarse subangular blocky structure; firm; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; neutral; gradual smooth boundary.

2C—52 to 60 inches; yellowish brown (10YR 5/6) clay loam; many medium and coarse prominent

light gray (10YR 6/1) mottles; massive; firm; few fine irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 48 to 60 inches

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

BA horizon:
Hue—10YR
Value—4
Chroma—3
Texture—silty clay loam

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

2C horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 to 6
Texture—clay loam

822D2—Lamoni silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Lamoni 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Pedisediment over 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 9.6 inches (high)
Content of organic matter in the surface layer: About 2.7 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

- Areas that are not eroded

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

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

- Agronomy section

Lindley Series

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, 1,835 feet north and 140 feet east of the center of sec. 19, T. 71 N., R. 11 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (2.5Y 5/2) dry; weak fine granular structure; friable; many fine and medium roots; slightly acid; clear smooth boundary.

E—5 to 10 inches; brown (10YR 5/3) loam, very pale brown (10YR 7/3) dry; weak medium platy structure parting to weak medium subangular blocky; friable; many fine and medium roots; very few faint light brownish gray (10YR 6/2) silt coatings on faces of peds; strongly acid; clear wavy boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; few fine roots; very few faint yellowish brown (10YR 5/4) clay films on faces of peds and in pores; few fine pebbles; very strongly acid; gradual smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 4/6) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct clay films on faces of peds; few fine pebbles; very strongly acid; gradual smooth boundary.

Bt3—26 to 31 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine pebbles; very strongly acid; gradual smooth boundary.

Bt4—31 to 41 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 4/6) and brown (10YR 5/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; few fine pebbles; very strongly acid; gradual smooth boundary.

Bt5—41 to 48 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct strong brown (7.5YR 4/6) and grayish brown (10YR 5/2) mottles; weak medium prismatic structure; firm; few fine roots; very few faint clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; few fine pebbles; very strongly acid; gradual smooth boundary.

C—48 to 60 inches; mottled yellowish brown (10YR 5/6), grayish brown (10YR 5/2), and strong brown (7.5YR 5/6) clay loam; massive; firm; few fine pebbles; slightly acid.

Range in Characteristics

Thickness of the solum: 30 to 50 inches

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

E horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture—loam

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

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

65D2—Lindley loam, 9 to 14 percent slopes, moderately eroded

Composition

Lindley and similar soils: About 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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 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
- Areas of severely eroded 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 90 percent
Inclusions: About 10 percent

Setting

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

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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
- Soils that have a surface layer of silt loam

Major Uses of the Unit

- 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 90 percent
Inclusions: About 10 percent

Setting

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

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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
- Areas of severely eroded soils

Major Uses of the Unit

- 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 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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

- Areas that have limestone bedrock at the surface
- Soils that have a subsoil of sandy loam
- Areas of severely eroded 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 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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

- Areas that have limestone bedrock at the surface
- Soils that have a surface layer of silt loam
- Areas of eroded 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 45 percent
Keswick and similar soils: About 45 percent
Inclusions: About 10 percent

Setting

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

Component Description

Lindley

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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 percent (moderate)

Keswick

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.8 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

- Ashgrove and similar soils
- Areas of severely eroded 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 45 percent
Keswick and similar soils: About 45 percent
Inclusions: About 10 percent

Setting

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

Component Description

Lindley

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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)

Keswick

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Pedisediments over 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 8.7 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

- Ashgrove and similar soils
- Areas of severely eroded soils

Major Uses of the Unit

- Hayland
- Pasture
- Forest land

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

- Agronomy section
- Forest Land section

Mahaska Series

Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Uplands

Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 5 percent

Typical Pedon

Mahaska silty clay loam, 2 to 5 percent slopes, 750 feet east and 530 feet north of the southwest corner of sec. 24, T. 73 N., R. 11 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few fine roots; very few prominent white (10YR 8/1) silt coatings on faces of peds; neutral; abrupt smooth boundary.

A1—8 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; few fine roots; very few prominent white (10YR 8/1) silt coatings on faces of peds; neutral; clear smooth boundary.

A2—16 to 20 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; few fine roots; very few prominent white (10YR 8/1) silt coatings on faces of peds; moderately acid; clear smooth boundary.

BA—20 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct brown (10YR 5/3) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; few prominent white (10YR 8/1) silt coatings on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; strongly acid; clear smooth boundary.

Bt1—24 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt2—31 to 37 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; strong medium subangular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt3—37 to 49 inches; mottled light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—49 to 55 inches; mottled light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) silty clay loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

BC—55 to 60 inches; mottled light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 48 to more than 60 inches
Thickness of the mollic epipedon: 14 to 24 inches

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

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

Bt horizon (upper part):
Hue—2.5Y or 10YR
Value—4 or 5
Chroma—2 or 3
Texture—silty clay loam or silty clay

Bt horizon (lower part):
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—2 or 3
Texture—silty clay loam or silty clay

BC horizon:
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—2 or 3
Texture—silty clay loam or silty clay

280—Mahaska silty clay loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Uplands
Geomorphic component: Divides
Hillslope position: Summits
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.0 inches (high)
Content of organic matter in the surface layer: About 5.5 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

- Taintor 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

280B—Mahaska silty clay loam, 2 to 5 percent slopes

Composition

Mahaska 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: Shoulders and summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 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

- Areas of eroded 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

Nira Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Uplands
Parent material: Deoxidized loess
Native vegetation: Prairie
Slope range: 5 to 9 percent
Taxadjunct features: The Nira soils in this county do not have a mollic epipedon.

Typical Pedon

Nira silty clay loam, 5 to 9 percent slopes, moderately eroded, 695 feet east and 175 feet south of the center of sec. 15, T. 73 N., R. 11 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (2.5Y 5/2) dry; about 30 percent streaks and pockets of brown (10YR 4/3) subsoil material; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

BA—7 to 11 inches; brown (10YR 4/3) silty clay loam; about 20 percent mixings of very dark gray (10YR 3/1) material from the surface layer; weak very fine and fine subangular blocky structure; friable; few fine roots; neutral; abrupt smooth boundary.

Bw1—11 to 16 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; few distinct organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bw2—16 to 21 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fine roots; few distinct organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bw3—21 to 31 inches; gray (5Y 5/1) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few fine roots; few distinct organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

BC—31 to 39 inches; gray (5Y 5/1) silty clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak medium prismatic structure; friable; few fine roots; few distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

C1—39 to 46 inches; gray (5Y 5/1) silty clay loam; few medium prominent yellowish brown (10YR 5/8) mottles; massive; friable; few fine roots; few distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

C2—46 to 60 inches; gray (5Y 5/1) silty clay loam; common fine faint olive gray (5Y 5/2) and many medium and coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable; few distinct organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 30 to 50 inches

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

Bw horizon (upper part):
Hue—10YR
Value—4 or 5
Chroma—1 to 4
Texture—silty clay loam

Bw horizon (lower part, within a depth of 30 inches):
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam

BC or C horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam

570C2—Nira silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Deoxidized 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 11.7 inches (high)
Content of organic matter in the surface layer: About 2.7 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
- Areas of severely eroded 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

Nodaway Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Flood plains and upland drainageways
Parent material: Silty alluvium or local alluvium
Native vegetation: Mixed prairie grasses and deciduous trees
Slope range: 0 to 5 percent

Typical Pedon

Nodaway silt loam, 0 to 2 percent slopes, 1,820 feet west and 142 feet south of the northeast corner of sec. 2, T. 72 N., R. 8 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to weak very fine and fine granular; friable; few fine roots; neutral; abrupt smooth boundary.

C—7 to 60 inches; stratified dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), grayish brown (10YR 5/2), and brown (10YR 5/3) silt loam; massive but appears platy because of stratification; friable; few fine roots; neutral.

Range in Characteristics

Thickness of the solum: 6 to 10 inches

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

C horizon:
Hue—10YR
Value—3 to 5
Chroma—1 to 4
Texture—silt loam

220—Nodaway silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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

- Soils that have a substratum of sandy loam
- Soils that have a substratum of silty clay

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

Composition

Nodaway and similar soils: About 50 percent
Klum and similar soils: About 30 percent
Perks and similar soils: About 20 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Nodaway

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Local alluvium
Frequency of flooding: 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)

Klum

Surface layer texture: Fine sandy loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Local alluvium
Frequency of flooding: 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 9.5 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Perks

Surface layer texture: Sand
Depth to bedrock: Greater than 60 inches
Drainage class: Excessively drained
Dominant parent material: Local alluvium
Frequency of flooding: Occasional
Depth to the water table: Greater than 6.0 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

729—Nodaway-Coppock complex, 0 to 2 percent slopes

Composition

Nodaway and similar soils: About 55 percent
Coppock and similar soils: About 40 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Nodaway

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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)

Coppock

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 11.7 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

- Areas of stratified sandy loam

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 40 percent
Cantril and similar soils: About 20 percent

Setting

Landform: Upland drainageways
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope: 2 to 5 percent

Component Description

Nodaway

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 11.7 inches (high)
Content of organic matter in the surface layer: About 2 percent (moderate)

Cantril

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Local alluvium or colluvium
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 9.4 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

1715—Nodaway-Vesser-Ackmore complex, 0 to 2 percent slopes

Composition

Nodaway and similar soils: About 40 percent
Vesser and similar soils: About 35 percent
Ackmore and similar soils: About 20 percent
Inclusions: About 5 percent

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Nodaway

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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)

Vesser

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 11.9 inches (high)
Content of organic matter in the surface layer: About 3.5 percent (moderate)

Ackmore

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: 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 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

- Soils that have a substratum of sandy loam

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

Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess over limestone
Native vegetation: Forest
Slope range: 25 to 40 percent

Typical Pedon

Nordness silt loam, 25 to 40 percent slopes, 2,340 feet east and 1,020 feet north of the southwest corner of sec. 1, T. 73 N., R. 8 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very pale brown (10YR 7/3) dry; weak fine granular structure; friable; few fine roots; neutral; clear smooth boundary.
E—4 to 8 inches; grayish brown (10YR 5/2) silt loam; weak thin platy structure; friable; few fine roots; moderately acid; clear smooth boundary.
BE—8 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; moderately acid; clear smooth boundary.
2Bt—11 to 17 inches; strong brown (7.5YR 5/6) clay loam; weak fine subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; about 5 percent fine limestone fragments and glacial pebbles; strongly acid; abrupt wavy boundary.
2R—17 inches; fractured limestone bedrock.

Range in Characteristics

Thickness of the solum: 8 to 20 inches

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

E horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture—silt loam or 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
Content of coarse fragments—5 to 10 percent

499G—Nordness silt loam, 25 to 40 percent slopes

Composition

Nordness 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: 25 to 40 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: 8 to 20 inches
Drainage class: Well drained
Dominant parent material: Loess over limestone
Flooding: None
Depth to the water table: Greater than 6.0 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 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

- Areas that have limestone bedrock at the surface
- Soils that are deeper over bedrock

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

Okaw Series

Drainage class: Poorly drained
Permeability: Very slow
Landform: Stream terraces
Parent material: Local alluvium
Native vegetation: Forest
Slope range: 0 to 2 percent

Typical Pedon

Okaw silt loam, 0 to 2 percent slopes, 530 feet east and 1,800 feet north of the southwest corner of sec. 13, T. 73 N., R. 8 W.

Ap—0 to 8 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; neutral; abrupt smooth boundary.

E—8 to 17 inches; light brownish gray (10YR 6/2) silt loam, white (10YR 8/2) dry; few fine prominent strong brown (7.5YR 5/6) mottles; moderate thin platy structure; friable; few fine roots; strongly acid; gradual smooth boundary.

2Btg1—17 to 24 inches; grayish brown (10YR 5/2) silty clay; common fine prominent strong brown (7.5YR 5/6) mottles; strong fine and medium angular blocky structure; very firm; few fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; few distinct white (10YR 8/1) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

2Btg2—24 to 40 inches; grayish brown (10YR 5/2) silty clay; common medium faint brown (10YR 4/3 and 5/3) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate coarse subangular blocky; very firm; few fine roots; many distinct clay films on faces of peds and in pores; very strongly acid; gradual smooth boundary.

2Btg3—40 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent strong brown (7.5YR 4/6 and 5/6) mottles; weak medium prismatic structure parting to moderate coarse subangular blocky; very firm; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and common faint clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

2BCg—48 to 55 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent strong brown (7.5YR 4/6 and 5/6) mottles; weak medium prismatic structure; very firm; common distinct

very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

2Cg—55 to 60 inches; grayish brown (10YR 5/2) silty clay loam; common coarse faint dark gray (10YR 4/1) and many medium prominent strong brown (7.5YR 4/6 and 5/6) mottles; massive; firm; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

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

E horizon:
Hue—10YR
Value—4 to 7
Chroma—1 or 2
Texture—silt loam

2Btg horizon (upper part):
Hue—10YR, 2.5Y, or neutral
Value—3 to 6
Chroma—0 to 2
Texture—silty clay or clay

2Btg horizon (lower part):
Hue—10YR, 2.5Y, or neutral
Value—3 to 6
Chroma—0 to 2
Texture—silty clay, clay, or silty clay loam

2BCg or 2Cg horizon:
Hue—10YR to 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

Composition

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

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Local alluvium
Frequency of flooding: Rare
Seasonal high water table: 0.5 foot above to 1.0 foot below the surface
Kind of water table: Apparent
Ponding duration: Brief
Available water capacity to 60 inches or root-limiting layer: About 9.7 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

- Somewhat 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

Olmitz Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Upland drainageways and alluvial fans
Parent material: Loamy alluvium or local alluvium
Native vegetation: Prairie
Slope range: 2 to 5 percent

Typical Pedon

Olmitz loam, in an area of Olmitz-Vesser-Zook complex, 0 to 5 percent slopes, 1,280 feet east and 680 feet south of the northwest corner of sec. 7, T. 72 N., R. 10 W.

Ap—0 to 8 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak very fine and fine granular

structure; friable; few fine roots; moderately acid; abrupt smooth boundary.
A1—8 to 19 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; moderately acid; gradual smooth boundary.
A2—19 to 25 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; weak fine and medium subangular blocky structure; friable; few fine roots; moderately acid; gradual smooth boundary.
Bw1—25 to 33 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) and many faint dark brown (10YR 3/3) organic coatings on faces of peds; moderately acid; gradual smooth boundary.
Bw2—33 to 43 inches; dark yellowish brown (10YR 4/4) clay loam; few fine faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; few distinct brown (10YR 4/3) coatings on faces of peds; moderately acid; gradual smooth boundary.
2BC—43 to 60 inches; yellowish brown (10YR 5/4) clay loam; common fine faint yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to weak medium and coarse subangular blocky; firm; few fine roots; few distinct light gray (10YR 7/2) silt coatings on faces of peds in the upper part; few fine irregular soft masses of iron-manganese; few fine pebbles; strongly acid.

Range in Characteristics

Thickness of the solum: 36 to more than 60 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—2
Texture—loam or clay loam

Bw horizon:
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—loam or clay loam

2BC horizon:
Hue—10YR
Value—4 or 5
Chroma—4 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 25 percent
Inclusions: About 7 percent

Setting

Landform: Upland drainageways
Geomorphic component: Base slopes
Hillslope position: Toeslopes and footslopes
Slope: Olmitz and Vesser—2 to 5 percent; Zook—0 to 5 percent

Component Description

Olmitz

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Local alluvium
Flooding: None
Depth to the water table: Greater than 6.0 feet
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)

Vesser

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Local 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 11.9 inches (high)
Content of organic matter in the surface layer: About 2.5 percent (moderate)

Zook

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Local alluvium

Flooding: None
Seasonal high water table: 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 9.0 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.

Inclusions

- Areas that have a lighter colored overwash
- Soils that have a subsoil of stratified sandy loam

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
Geomorphic component: Base slopes
Hillslope position: Footslopes and toeslopes
Slope: 2 to 5 percent

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Drainage class: Moderately well drained
Dominant parent material: Loamy alluvium
Flooding: None
Depth to the water table: Greater than 6.0 feet
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

5040—Orthents, loamy

Composition

Orthents: Variable

Component Description

Surface layer texture: Loam
Depth to bedrock: Greater than 60 inches
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 6.6 inches (moderate)

Description of the Unit

- This map unit consists of nearly level to steep areas from which soil material has been removed for use in other areas.

Major Uses of the Unit

- Wildlife habitat

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

- Wildlife Habitat section

Otley Series

Drainage class: Moderately well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess
Native vegetation: Prairie
Slope range: 2 to 9 percent
Taxadjunct features: The Otley soils in map units 281B2 and 281C2 do not have a mollic epipedon.

Typical Pedon

Otley silty clay loam, 2 to 5 percent slopes, 150 feet

west and 260 feet north of the center of sec. 17, T. 73 N., R. 11 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure parting to weak very fine and fine granular; friable; few fine roots; moderately acid; abrupt smooth boundary.

A—10 to 18 inches; very dark brown (10YR 2/2) and black (10YR 2/1) silty clay loam, brown (10YR 4/3) dry; moderate very fine subangular blocky structure; friable; few fine roots; moderately acid; gradual smooth boundary.

Bt1—18 to 25 inches; brown (10YR 4/3) and very dark grayish brown (10YR 3/2) silty clay loam; moderate very fine and fine subangular blocky structure; friable; few fine roots; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt2—25 to 33 inches; brown (10YR 5/3) silty clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—33 to 41 inches; pale brown (10YR 6/3) silty clay loam; few medium distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate fine and medium prismatic structure parting to strong medium angular blocky; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt4—41 to 57 inches; light brownish gray (2.5Y 6/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 4/6) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; common distinct clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

C—57 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) mottles; massive; friable; few prominent very dark grayish brown (10YR 3/2) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; moderately acid.

Range in Characteristics

Thickness of the solum: 48 to 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

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

Bt horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam

Bt horizon (lower part):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silty clay loam

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

281B—Otley silty clay loam, 2 to 5 percent slopes

Composition

Otley 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 summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.9 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.

Inclusions

- Areas of eroded soils
- Mahaska 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

281B2—Otley silty clay loam, 2 to 5 percent slopes, moderately eroded

Composition

Otley 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 summits
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 12.2 inches (high)
Content of organic matter in the surface layer: About 2.7 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

- Mahaska and similar soils
- Areas of severely eroded 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

281C—Otley silty clay loam, 5 to 9 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 11.9 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.

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

281C2—Otley silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 12.2 inches (high)
Content of organic matter in the surface layer: About 2.7 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
- Areas of severely eroded 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

Perks Series

Drainage class: Excessively drained
Permeability: Rapid
Landform: Flood plains
Parent material: Sandy textured alluvium or local alluvium
Native vegetation: Forest
Slope range: 0 to 2 percent

Typical Pedon

Perks loamy sand, in an area of Nodaway-Klum-Perks complex, 0 to 3 percent slopes, 600 feet north and 63 feet east of the southwest corner of sec. 2, T. 72 N., R. 8 W.

Ap—0 to 9 inches; brown (10YR 4/3) loamy sand, light brownish gray (10YR 6/2) dry; single grain; loose; few fine roots; strongly acid; abrupt smooth boundary.
C1—9 to 21 inches; dark yellowish brown (10YR 4/4) sand; single grain; loose; few fine roots; strongly acid; gradual smooth boundary.
C2—21 to 41 inches; brown (10YR 4/3) sand; common medium strata of light brownish gray (10YR 6/2) fine sand; single grain; loose; few fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings throughout; strongly acid; gradual smooth boundary.
C3—41 to 60 inches; dark yellowish brown (10YR 4/4) sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; strongly acid.

Range in Characteristics

Thickness of the solum: 5 to 9 inches

A or Ap horizon:
Hue—10YR
Value—2 to 4
Chroma—1 to 3
Texture—loamy sand

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

139—Perks loamy sand, 1 to 3 percent slopes

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Loamy sand
Depth to bedrock: Greater than 60 inches
Drainage class: Excessively drained
Dominant parent material: Sandy textured alluvium
Frequency of flooding: Occasional
Depth to the water table: Greater than 6.0 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

- Soils that have a substratum of silt loam

Major Uses of the Unit

- 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

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, 500 feet east and 750 feet south of the center of sec. 35, T. 71 N., R. 11 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.
E—9 to 15 inches; grayish brown (10YR 5/2) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure; friable; few fine roots; many distinct light gray (10YR 7/1) silt coatings on faces of peds; neutral; clear smooth boundary.
BE—15 to 20 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silty clay loam; weak medium platy structure parting to moderate fine subangular blocky; friable; few fine roots; common distinct light gray (10YR 7/1) silt coatings on faces of peds; slightly acid; clear smooth boundary.
Btg1—20 to 28 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/4 and 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; very few light gray (10YR 7/1) silt coatings on faces of peds and in pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg2—28 to 42 inches; grayish brown (2.5Y 5/2) silty clay; common fine and medium prominent yellowish brown (10YR 5/4 and 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; very few organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg3—42 to 54 inches; grayish brown (2.5Y 5/2) silty clay; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium and coarse subangular blocky structure; firm; common prominent clay films on faces of peds; very few organic coatings in root channels and pores; few fine 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; common medium and coarse prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few faint clay films on faces of peds; very few prominent organic coatings in root channels and pores; few fine 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 or silty clay loam

E horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2
Texture—silt loam

Btg horizon (upper part):
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 8
Texture—silty clay or silty clay loam

Btg horizon (lower part):
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay or 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: 2 to 5 percent

Component Description

Surface layer texture: 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: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 12.1 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

- Belinda and similar soils
- Areas of eroded 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 95 percent
Inclusions: About 5 percent

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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

- Areas of severely eroded 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 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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
- 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: About 90 percent
Inclusions: About 10 percent

Setting

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

Component Description

Surface layer texture: 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: 2 to 4 feet
Kind of water table: Perched
Available water capacity to 60 inches or root-limiting layer: About 12.1 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

- Belinda and similar soils
- Areas of eroded 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

831C2—Pershing silty clay loam, bench, 5 to 9 percent slopes, moderately eroded

Composition

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

Setting

Landform: Stream terraces
Geomorphic component: Side slopes, nose slopes, head slopes, and interfluves
Hillslope position: Shoulders and backslopes
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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

- Soils that have a sandy and gravelly subsoil
- Galland 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

5020—Pits and Dumps

Composition

Pits and Dumps: Variable

Description

- This map unit consists of pits and dumps in areas where minerals have been removed.

5030—Pits, limestone quarries

Composition

Pits, limestone quarries: Variable

Description

- This map unit consists of pits from which limestone has been removed.

Richwood Series

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, 2,200 feet west and 260 feet south of the northeast corner of sec. 13, T. 72 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; friable; few fine roots; slightly acid; abrupt smooth boundary.
A—9 to 15 inches; dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.
BA—15 to 19 inches; dark yellowish brown (10YR 4/4) and brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few fine roots; neutral; clear smooth boundary.
Bt1—19 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.
Bt2—25 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron-manganese; neutral; gradual smooth boundary.
Bt3—32 to 45 inches; yellowish brown (10YR 5/4)

silty clay loam; common fine prominent strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine irregular soft masses of iron-manganese; neutral; gradual smooth boundary.

BC—45 to 60 inches; yellowish brown (10YR 5/4) silt loam; many fine and medium distinct light brownish gray (10YR 6/2) and few fine prominent strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; friable; few fine roots; few fine irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 40 to more than 60 inches
Thickness of the mollic epipedon: 10 to 17 inches
Depth to stratified sediments: 60 to 72 inches

Ap or A horizon:
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 or silty clay loam

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

BC horizon:
Hue—10YR or 7.5YR
Value—3 to 5
Chroma—3 or 4
Texture—silt loam or loam

977—Richwood silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Silty alluvium
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 12.5 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.

Inclusions

- Soils that have a subsoil of loam

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

Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Loess over 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, 2,430 feet south and 100 feet east of the northwest corner of sec. 4, T. 73 N., R. 10 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) 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.

BE—8 to 13 inches; dark grayish brown (10YR 4/2) silty clay loam; about 10 percent mixings of very dark grayish brown (10YR 3/2) material from the surface layer; moderate fine subangular blocky structure; friable; few fine roots; very few prominent white (10YR 8/1) silt coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

Btg1—13 to 17 inches; dark grayish brown (10YR 4/2) silty clay; many fine distinct yellowish brown (10YR 5/4) and prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and in pores; few prominent white (10YR 8/1) silt coatings on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in root channels; few fine irregular soft masses of iron-manganese; strongly acid; clear smooth boundary.

2Btg2—17 to 24 inches; dark grayish brown (2.5Y 4/2) clay; many fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; common distinct very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

2Btg3—24 to 34 inches; dark grayish brown (2.5Y 4/2) clay; few fine prominent yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few distinct very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

2Btg4—34 to 43 inches; olive gray (5Y 5/2) clay; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few intersecting slickensides on horizontal faces of peds; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

2Btg5—43 to 60 inches; gray (5Y 5/1) clay; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few intersecting slickensides on horizontal faces of peds; few fine irregular soft masses of iron-manganese; neutral.

Range in Characteristics

Thickness of the solum: 42 to more than 60 inches

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

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

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

2Bt horizon:
Hue—10YR to 5Y
Value—4 to 6
Chroma—1 or 2
Texture—clay or silty clay

223C2—Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded

Composition

Rinda 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: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess over gray paleosol weathered from glacial till
Flooding: None
Seasonal high water table: At the surface to 1 foot below the surface

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.

Inclusions

- Armstrong and similar soils
- Areas of severely eroded 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

Rubio Series

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

Typical Pedon

Rubio silt loam, 0 to 2 percent slopes, 560 feet north and 180 feet west of the center of sec. 16, T. 72 N., R. 10 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; neutral; abrupt smooth boundary.
E—8 to 16 inches; gray (10YR 5/1) silt loam, light gray (10YR 7/1) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; few distinct silt coatings on faces of peds; strongly acid; clear smooth boundary.
Btg1—16 to 22 inches; dark gray (10YR 4/1) silty clay loam; few fine prominent brownish yellow (10YR 6/6) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and in pores; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg2—22 to 31 inches; dark gray (10YR 4/1) silty clay; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg3—31 to 39 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; common distinct clay films on faces of peds and in pores; very few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.
Btg4—39 to 47 inches; olive gray (5Y 5/2) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; few distinct clay films on faces of peds and in pores; few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.
BCg—47 to 60 inches; olive gray (5Y 5/2) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; friable; few fine roots; few prominent very dark gray (10YR 3/1) organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 42 to more than 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

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

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

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

74—Rubio silt loam, 0 to 2 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 10.6 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

- Givin 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

Shelby Series

Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Glacial till
Native vegetation: Prairie
Slope range: 9 to 14 percent
Taxadjunct features: The Shelby soils in this county do not have a mollic epipedon.

Typical Pedon

Shelby clay loam, 9 to 14 percent slopes, moderately eroded, 2,568 feet east and 485 feet north of the southwest corner of sec. 24, T. 73 N., R. 11 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) clay loam, dark gray (10YR 4/1) dry; about 30 percent streaks and pockets of brown (10YR 4/3) subsoil material; weak fine granular structure; friable; few fine roots; about 1 percent pebbles; strongly acid; abrupt smooth boundary.

BA—8 to 16 inches; brown (10YR 4/3) clay loam; weak very fine and fine subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; about 1 percent pebbles; strongly acid; clear smooth boundary.

Bt1—16 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; about 1 percent pebbles; strongly acid; gradual smooth boundary.

Bt2—22 to 35 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky

structure; firm; few fine roots; common faint clay films on faces of peds; about 1 percent pebbles; strongly acid; gradual smooth boundary.

Bt3—35 to 45 inches; brown (10YR 5/3) clay loam; few fine and medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; many faint clay films on faces of peds; few fine irregular soft masses of iron-manganese; about 1 percent pebbles; strongly acid; gradual smooth boundary.

BC—45 to 60 inches; brown (10YR 5/3) clay loam; common fine faint grayish brown (10YR 5/2) and few fine and medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; firm; few fine roots; few fine irregular soft masses of iron-manganese; about 1 percent pebbles; strongly acid.

Range in Characteristics

Thickness of the solum: 30 to more than 60 inches
Depth to carbonates: 40 to more than 60 inches

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

BA or Bt horizon (upper part):
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—clay loam

Bt horizon (lower part):
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Texture—clay loam

BC horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 or 3
Texture—clay loam

24D2—Shelby clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Shelby and similar soils: About 85 percent
Inclusions: About 15 percent

Setting

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

Component Description

Surface layer texture: Clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Well drained
Dominant parent material: Glacial till
Flooding: None
Depth to the water table: Greater than 6.0 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 2.7 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

- Adair and similar soils
- Clarinda and similar soils
- Areas of severely eroded 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

Sparta Series

Drainage class: Excessively drained
Permeability: Rapid
Landform: Uplands and stream terraces
Parent material: Eolian sand
Native vegetation: Prairie
Slope range: 2 to 5 percent

Typical Pedon

Sparta loamy fine sand, 2 to 5 percent slopes, 2,200 feet west and 80 feet south of the northeast corner of sec. 13, T. 72 N., R. 8 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; weak very fine and fine granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.
AB—9 to 20 inches; dark brown (10YR 3/3) loamy fine sand, grayish brown (10YR 5/2) dry; single grain; loose; few fine roots; slightly acid; gradual smooth boundary.
Bw—20 to 30 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; few fine roots; slightly acid; gradual smooth boundary.
C—30 to 60 inches; dark yellowish brown (10YR 4/6) sand; single grain; loose; slightly acid.

Range in Characteristics

Thickness of the solum: 24 to 45 inches
Thickness of the mollic epipedon: 10 to 22 inches

Ap horizon:
Hue—10YR or 7.5YR
Value—2 or 3
Chroma—1 or 2
Texture—loamy fine sand

AB horizon:
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—2 or 3
Texture—loamy fine sand or loamy sand

Bw horizon:
Hue—10YR or 7.5YR
Value—3 to 6
Chroma—3 to 6
Texture—loamy fine sand, loamy sand, fine sand, or sand

C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—sand or fine sand

41B—Sparta loamy fine sand, 2 to 5 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Loamy fine sand
Depth to bedrock: Greater than 60 inches
Drainage class: Excessively drained
Dominant parent material: Eolian sand
Flooding: None
Depth to the water table: Greater than 6.0 feet
Available water capacity to 60 inches or root-limiting layer: About 4.6 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

- Soils that have less sand in the profile than the Sparta soil

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

Sperry Series

Drainage class: Very poorly drained
Permeability: Slow
Landform: Upland depressions
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 1 percent

Typical Pedon

Sperry silt loam, 0 to 1 percent slopes, 1,480 feet south and 150 feet west of the northeast corner of sec. 8, T. 73 N., R. 10 W.

A—0 to 10 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine

granular structure; friable; moderately acid; clear smooth boundary.
E—10 to 18 inches; dark gray (10YR 4/1) silt loam; weak fine subangular blocky structure; friable; few fine irregular soft masses of iron-manganese; slightly acid; abrupt smooth boundary.
Btg1—18 to 30 inches; dark gray (10YR 4/1) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) mottles; strong fine subangular blocky structure; firm; common distinct clay films on faces of peds and in pores; very dark gray (10YR 3/1) organic coatings on faces of peds; moderately acid; gradual smooth boundary.
Btg2—30 to 35 inches; gray (10YR 5/1) silty clay; many fine and medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium subangular blocky structure; firm; common distinct clay films on faces of peds; moderately acid; gradual smooth boundary.
Btg3—35 to 42 inches; gray (10YR 5/1) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary.
BCg—42 to 52 inches; light olive gray (5Y 6/2) and olive gray (5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak medium prismatic structure parting to weak and moderate medium subangular blocky; friable; few distinct very dark gray (10YR 3/1) clay films in pores and on faces of peds; slightly acid; gradual smooth boundary.
Cg—52 to 60 inches; light olive gray (5Y 6/2) and olive gray (5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; massive; few distinct very dark gray (10YR 3/1) clay films in pores; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the mollic epipedon: 10 to 16 inches

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

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

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

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

122—Sperry silt loam, 0 to 1 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Very poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 1 foot above to 1 foot below the surface
Kind of water table: Apparent
Ponding duration: Long
Available water capacity to 60 inches or root-limiting layer: About 11.7 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.

Inclusions

- Taintor 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

Taintor Series

Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Upland flats
Parent material: Loess
Native vegetation: Prairie
Slope range: 0 to 2 percent

Typical Pedon

Taintor silty clay loam, 0 to 2 percent slopes, 130 feet north and 105 feet east of the southwest corner of sec. 4, T. 73 N., R. 11 W.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few fine roots; neutral; abrupt smooth boundary.

A1—8 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine subangular blocky structure; friable; few fine roots; neutral; gradual smooth boundary.

A2—16 to 22 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate medium subangular blocky structure; firm; few fine roots; common distinct black (10YR 2/1) organic coatings on faces of peds and in pores; few fine and medium irregular wormcasts; slightly acid; clear smooth boundary.

Btg1—22 to 26 inches; dark gray (10YR 4/1) silty clay; few fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds and in pores; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Btg2—26 to 32 inches; dark gray (5Y 4/1) and dark gray (10YR 4/1) silty clay; few fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine rounded soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg3—32 to 36 inches; gray (5Y 5/1) and dark gray (10YR 4/1) silty clay; common fine prominent yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine rounded soft masses of iron-manganese; neutral; gradual smooth boundary.

Btg4—36 to 46 inches; olive gray (5Y 5/2) silty clay loam; few fine faint light olive gray (5Y 6/2) and few fine prominent strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct clay films on faces of peds and in pores; few distinct dark gray (10YR 4/1) organic coatings in root channels and pores; few fine rounded soft masses of iron-manganese; neutral; gradual smooth boundary.

BCg—46 to 55 inches; olive gray (5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; friable; few fine roots; few distinct dark gray (10YR 4/1) organic coatings in root channels and pores; few fine rounded soft masses of iron-manganese; neutral; gradual smooth boundary.

Cg—55 to 60 inches; grayish brown (2.5Y 5/2) silt loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine roots; few distinct dark gray (10YR 4/1) organic coatings in root channels and pores; neutral.

Range in Characteristics

Thickness of the solum: 42 to 60 inches
Thickness of the mollic epipedon: 16 to 24 inches

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

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 or 2
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 or silt loam

279—Taintor silty clay loam, 0 to 2 percent slopes

Composition

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

Setting

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

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Loess
Flooding: None
Seasonal high water table: 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 11.3 inches (high)
Content of organic matter in the surface layer: About 5.5 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

- Sperry 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

Tuskeego Series

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, 380 feet north and 1,540 feet east of the center of sec. 31, T. 72 N., R. 10 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; few fine roots; strongly acid; abrupt smooth boundary.

E1—9 to 14 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; many distinct silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

E2—14 to 18 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; common fine and medium prominent strong brown (7.5YR 5/6) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; common distinct silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Btg1—18 to 21 inches; gray (10YR 5/1) silty clay loam; common fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; many clay films on faces of peds and in pores; few distinct silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Btg2—21 to 30 inches; gray (10YR 5/1) silty clay; common fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg3—30 to 37 inches; grayish brown (2.5Y 5/2) silty clay; many fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; very strongly acid; gradual smooth boundary.

Btg4—37 to 46 inches; grayish brown (2.5Y 5/2) silty clay; many fine and medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; weak medium and coarse subangular blocky structure; very firm; few fine roots; common distinct clay films on faces of peds and in pores; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

BC—46 to 60 inches; gray (5Y 5/1) silty clay loam; few fine prominent yellowish brown (10YR 5/4) and few fine and medium prominent strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; firm; few fine irregular soft masses of iron-manganese; moderately 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

E horizon:
Hue—10YR
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 loam or silty clay

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

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

453—Tuskeego silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Stream terraces
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Rare
Seasonal high water table: 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 11.4 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.

Inclusions

- Zook 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

Vesser Series

Drainage class: Somewhat poorly drained or poorly drained
Permeability: Moderate
Landform: Flood plains, upland drainageways, and alluvial fans
Parent material: Silty alluvium or local alluvium
Native vegetation: Prairie
Slope range: 0 to 5 percent

Typical Pedon

Vesser silt loam, 0 to 2 percent slopes, 2,180 feet north and 1,200 feet west of the southeast corner of sec. 21, T. 73 N., R. 9 W.

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

E1—10 to 15 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; common fine distinct yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; few prominent light gray (10YR 7/1) silt coatings on faces of peds; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; very strongly acid; clear smooth boundary.

E2—15 to 25 inches; gray (10YR 5/1) silt loam, light brownish gray (10YR 6/2) dry; common fine distinct brown (10YR 4/3) and yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to moderate fine subangular blocky; friable; few fine roots; few prominent light gray (10YR 7/1) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Btg1—25 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine brown (10YR 4/3) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds and in pores; few prominent light gray (10YR 7/1) silt coatings on faces of peds; few prominent dark gray (5Y 4/1) organic coatings on faces of peds and in root channels; very strongly acid; clear smooth boundary.

Btg2—31 to 40 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine yellowish brown (10YR 5/6 and 5/8) mottles; weak fine prismatic structure; firm; few fine roots; common faint clay films on faces of peds; few prominent dark gray (5Y 4/1) organic coatings on faces of peds and in root channels; very strongly acid; gradual smooth boundary.

Btg3—40 to 52 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure; firm; few fine roots; few faint clay films on faces of peds; few prominent dark gray (5Y 4/1) organic coatings on faces of peds and in root channels; very strongly acid; gradual smooth boundary.

BCg—52 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure; firm; few fine roots; very few prominent dark gray (5Y 4/1) organic coatings on faces of peds and in root channels; strongly acid.

Range in Characteristics

Thickness of the solum: More than 60 inches
Thickness of the mollic epipedon: 10 to 15 inches

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

E horizon:
Hue—10YR
Value—3 to 5
Chroma—1 or 2
Texture—silt loam

Btg horizon:
Hue—10YR or 2.5Y
Value—4 or 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

Composition

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

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 11.9 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.

Inclusions

- Areas of stratified sandy loam
- Areas that have a lighter colored overwash

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

Composition

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

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater than 60 inches
Drainage class: Somewhat poorly drained
Dominant parent material: Silty 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 11.9 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.

Inclusions

- Areas that have a lighter colored overwash

Major Uses of the Unit

- Cropland
- Hayland
- Pasture

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

- Agronomy section

Weller Series

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, 143 feet north and 1,200 feet east of the southwest corner of sec. 29, T. 71 N., R. 10 W.

Ap—0 to 7 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; neutral; abrupt smooth boundary.

E—7 to 11 inches; brown (10YR 5/3) silt loam; weak medium platy structure parting to weak fine subangular blocky; friable; few fine roots; many distinct silt coatings on faces of peds; neutral; clear smooth boundary.

BE—11 to 14 inches; yellowish brown (10YR 5/4) and brown (10YR 5/3) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; many distinct silt coatings on faces of peds; strongly acid; abrupt wavy boundary.

Bt1—14 to 22 inches; dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) silty clay; few fine prominent strong brown (7.5YR 5/6) and few medium distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; very firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; strongly acid; gradual smooth boundary.

Bt2—22 to 28 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silty clay; common fine prominent strong brown (7.5YR 5/6) and few medium distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; very firm; few fine roots; many distinct clay films on faces of peds; few fine irregular soft

masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt3—28 to 37 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) silty clay loam; few medium prominent strong brown (7.5YR 5/6) and few distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt4—37 to 44 inches; grayish brown (10YR 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and distinct yellowish brown (10YR 5/4) mottles; weak fine and medium subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; few fine irregular soft masses of iron-manganese; moderately acid; gradual smooth boundary.

Bt5—44 to 53 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; friable; few faint clay films on faces of peds; few faint organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid; gradual smooth boundary.

C—53 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/4) mottles; massive; friable; few faint organic coatings in root channels and pores; few fine irregular soft masses of iron-manganese; slightly acid.

Range in Characteristics

Thickness of the solum: 48 to 60 inches

Ap or A horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam or silty clay loam

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

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

Bt horizon (upper part):
Hue—10YR
Value—4 or 5
Chroma—4
Texture—silty clay or silty clay loam

Bt horizon (lower part):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—silty clay or silty clay loam

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

132B—Weller silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landform: Uplands
Geomorphic component: Interfluves
Hillslope position: Summits and shoulders
Slope: 2 to 5 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 10.8 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

- Beckwith 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

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: Head slopes, nose slopes, side slopes, and interfluves
Hillslope position: Shoulders, summits, and backslopes
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 10.8 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

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: Head slopes, nose slopes, side slopes, and interfluves
Hillslope position: Shoulders and backslopes
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 10.8 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

132D—Weller silt loam, 9 to 14 percent slopes

Composition

Weller 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: 9 to 14 percent

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 10.7 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

- Keswick and similar soils
- Areas of eroded 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

132D2—Weller silty clay loam, 9 to 14 percent slopes, moderately eroded

Composition

Weller 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 10.7 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
- Areas of severely eroded 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: About 95 percent
Inclusions: About 5 percent

Setting

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

Component Description

Surface layer texture: Silt loam
Depth to bedrock: Greater 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 10.8 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

- Beckwith 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: Side slopes, nose slopes, head slopes, and interfluves
Hillslope position: Shoulders and backslopes
Slope: 5 to 9 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 10.8 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

- Soils that have a sandy and gravelly subsoil
- Galland 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: 9 to 14 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater 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 10.7 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

- Soils that have a sandy and gravelly subsoil
- Galland 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

Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains and upland drainageways
Parent material: Silty alluvium or local alluvium
Native vegetation: Prairie
Slope range: 0 to 5 percent

Typical Pedon

Zook silty clay loam, 0 to 2 percent slopes, 1,700 feet north and 230 feet west of the southeast corner of sec. 27, T. 72 N., R. 11 W.

Ap—0 to 7 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak very fine and fine subangular blocky structure parting to weak fine granular; firm; few fine roots; moderately acid; clear smooth boundary.
A1—7 to 18 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; friable; few fine roots; moderately acid; gradual smooth boundary.
A2—18 to 37 inches; black (N 2/0) silty clay, very dark gray (10YR 3/1) dry; moderate medium subangular blocky structure; very firm; few fine roots; moderately acid; gradual smooth boundary.
Bg—37 to 53 inches; black (5Y 2/1) silty clay, dark gray (5Y 4/1) dry; moderate medium subangular blocky structure; very firm; few fine roots; slightly acid; gradual smooth boundary.
Cg—53 to 60 inches; very dark gray (5Y 3/1) silty clay, gray (5Y 5/1) dry; few fine prominent light brownish gray (2.5Y 6/2) mottles; massive; very firm; few fine roots; slightly acid.

Range in Characteristics

Thickness of the solum: 36 to more than 60 inches
Thickness of the mollic epipedon: 36 to more than 50 inches

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

Bg horizon:
Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay

Cg horizon:
Hue—10YR to 5Y
Value—2 to 5
Chroma—1
Texture—silty clay

54—Zook silty clay loam, 0 to 2 percent slopes

Composition

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

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Component Description

Surface layer texture: Silty clay loam
Depth to bedrock: Greater than 60 inches
Drainage class: Poorly drained
Dominant parent material: Silty alluvium
Frequency of flooding: Occasional
Seasonal high water table: 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 9.3 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.

Inclusions

- Areas that have a lighter colored overwash
- Soils that have a higher content of clay in the subsoil

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.

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 geomorphic component that forms the steepest inclined surface and principal element of many hillslopes (fig. 8). Backslopes in profile are commonly steep and linear and descend to a footslope. In terms of gradational process, backslopes are erosional forms produced mainly by mass wasting and running water.

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. It consists of a concave surface at the bottom of hillslopes that is underlain by colluvial and slope-wash materials or forms a colluvial apron or wedge; a three-dimensional analog of a footslope. Distal base slope sediments commonly grade into, interfinger with, or are buried by alluvial fills.

Beach deposits. Material, such as sand and gravel, that is generally laid down parallel to an active or relict shoreline of a postglacial 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 terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor

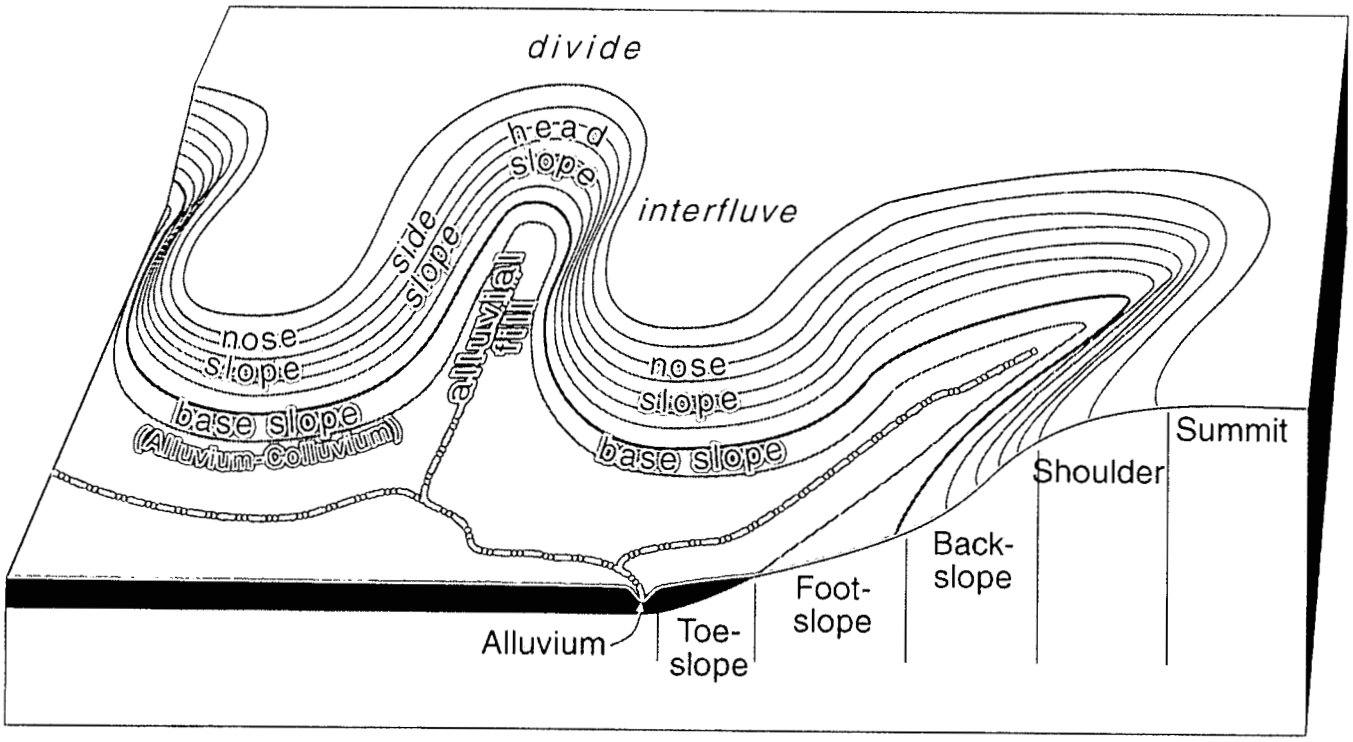

Figure 8.—Landscape relationship of geomorphic components and hillslope positions (modified after Ruhe and Walker, 1968).

formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

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 a 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 is, 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 loosen the subsoil and bring clods to the surface.

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.

Climax plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

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 is 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 is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is 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.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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 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. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the surface after planting in order to reduce the hazard of water erosion; in areas where wind erosion is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or its equivalent during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). 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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

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.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

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; 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 periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate or high water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of most field crops are affected. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted under natural conditions. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poor drainage is caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except for rice) under natural conditions.

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. The term is more often applied to cliffs resulting from differential erosion.

Esker. A long, narrow, sinuous, steep-sided ridge composed of irregularly stratified sand and gravel that were deposited by a subsurface stream flowing between ice walls or through ice tunnels of a retreating glacier and that were left behind when the ice melted. Eskers range from less than 1 mile to more than 100 miles in length and from 10 to 100 feet in height.

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

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

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

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.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

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

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is 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 inundation under flood-stage conditions unless protected artificially. It is generally a constructional landform consisting of sediment deposited during overflow and lateral migration of the stream.

Footslope. The geomorphic component that forms

the inner, gently inclined surface at the base of a hillslope. The surface is dominantly concave. In terms of gradational processes, a footslope is a transition zone between an upslope site of erosion (backslope) and a downslope site of deposition (toeslope).

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.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

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.

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 is 15 to 50 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 underlying material below the water table.

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

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope. The concave surface at the head of a drainageway where the flow of water converges downward toward the center and contour lines form concave curves.

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 6 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. 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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

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. A moundlike hill of glacial drift, composed chiefly of stratified sand and gravel.

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.

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 glacial drift in a topographic landform resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

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.

Neutral soil. A soil having a pH value between 6.6 and 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. The projecting end of an interfluve, where contour lines connecting the opposing side slopes form convex curves around the projecting end and lines perpendicular to the contours diverge downward. Overland flow of water is 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. An extensive area of glaciofluvial material that was deposited by meltwater streams.

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 to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Extremely slow	less than 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	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 thickness.

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; many are found in Wisconsin and Minnesota.

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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

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. Burning an area under conditions of weather and soil moisture and at the time of day that will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

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:

Extremely acid	less than 4.5
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 is generally 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 the 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 hillslope position that forms the uppermost inclined surface near the top of a hillslope. It comprises the transition zone 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. The slope bounding a drainageway and lying between the drainageway and the adjacent interfluve. It is generally linear along the slope width, and overland flow is parallel down the slope.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

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.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. 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 rock fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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

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 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 or loosen a layer that restricts roots.

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 profile and exhibiting a nearly level surface. A general term for the top, or highest level, of a landform such as a hill, mountain, or tableland. It usually refers to a high interfluve area of gentler slope that is flanked by steeper hillslopes, for example, mountain fronts or tableland escarpments.

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 due to uneven glacial deposition.

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

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances. It commonly is a massive, arcuate ridge or complex of ridges underlain by till and other types of drift.

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

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

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

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

Till. 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 or gently sloping soils that are underlain by till or consist of till. Slopes are 0 to 6 percent.

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

Toeslope. The outermost inclined surface at the base of a hill. Toeslopes are commonly gentle and linear in profile.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as salts, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

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

Upland (geology). 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.