Series 1957, No. 13

Issued March 1962

SOIL SURVEY

Buffalo County Wisconsin

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
UNIVERSITY OF WISCONSIN
Wisconsin Geological and Natural History Survey
Soil Survey Division
and
Wisconsin Agricultural Experiment Station

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Buffalo County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; serve as a reference for students and teachers; help prospective farmers, land appraisers, bankers, and real estate agents to decide the worth of a particular farm; and add to the soil scientist's fund of knowledge.

In making this soil survey, soil scientists walked over the county. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in the growth of crops, weeds, and grasses; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming, engineering, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, from the photographs, cartographers prepared the detailed soil map in the back of this report. Fields, woods, roads, streams, and many other landmarks that can be seen on the map are helpful in locating the area in which you are interested.

Locating the soils

Use the "Index to Map Sheets" at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been located, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. The symbol will be inside the area if there is enough room; otherwise, it will be outside the area and a pointer will show where the symbol belongs.

Finding information

Some readers will be more interested in one part of the report than in another, for the report has special sections for different groups, as well as sections that may be of value to all. The introductory part, which discusses the general geographic features of the county, the climate, the kinds of vegetation, and the physiography, geology, and drainage, will be of interest mainly to those not familiar with the county. Those not familiar with the county may also want to refer to the sections "Soil Associations" and "Agriculture."

Farmers and those who work with farmers will be interested mainly in the section "Descriptions of Soils" and in the section "Use and Management of the Soils." Study of these sections will aid them in identifying soils on a farm, in learning ways the soils can be managed, and in judging what yields can be expected. The "Guide to Mapping Units" at the back of the report will simplify use of the map and the report. This guide gives the map symbol for each soil, the name of the soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page where the capability unit is described.

Engineers will want to refer to the section "Engineering Properties of the Soils." Tables in that section show characteristics of the soils that affect engineering.

Soil scientists will find information about how the soils were formed and how they were classified in the section "Formation, Morphology, and Classification of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

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This soil survey is part of the technical assistance furnished by the Soil Conservation Service to the Buffalo County Soil Conservation District. Work on the survey was completed in 1957. Unless otherwise indicated all statements refer to conditions at the time the survey was in progress.

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Contents

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SOIL SURVEY OF BUFFALO COUNTY, WISCONSIN

REPORT BY DELBERT D. THOMAS, WITH CONTRIBUTIONS BY PAUL H. CARROLL AND GORDON N. WING, SOIL CONSERVATION SERVICE

FIELDWORK BY ORVILLE L. HASZEL, GORDON N. WING, DELBERT D. THOMAS, AND OTHERS,[1] SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY, SOIL SURVEY DIVISION, AND THE WISCONSIN AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF WISCONSIN

BUFFALO COUNTY is in the west-central part of Wisconsin (fig. 1). Three rivers form part of its boundaries. The Chippewa River is on the west; the Mississippi River is on the south; and the Trempealeau is on the lower eastern border. In addition, the county is bounded on the north by Eau Claire and Pepin Counties, and on its eastern edge, by Trempealeau County.

Figure 1.—**Location of Buffalo County in Wisconsin.**

The land area of the county is 712 square miles, or 455,680 acres. The county is 27 miles wide at its northern end, but in the southern part it tapers gradually to a point near the place where the Trempealeau and Mississippi Rivers join. It is approximately 38½ miles long. The county ranks forty-second in size among the 71 counties of the State. It has 17 civil townships. Alma is the county seat.

Dairying is the most important industry in Buffalo County, and the sale of livestock products other than dairy products accounts for a large part of the farm income. Hay crops, small grains, and corn are important because they provide a base for the dairy and livestock industries. Woodlands occupy more than a third of the land area of the county. They provide fuel, fence posts, and other wood products for use on the farms, and they also provide some cash income.

Description of the County

This section describes the climate and vegetation in the county. It also discusses the physiography, geology, and drainage.

Climate

The climate of Buffalo County is humid continental. It is characterized by moderately long, cold winters and by short summers that are warm and humid. The winters are slightly colder and the summers slightly warmer than in most of the rest of the State. In spring and in autumn, the temperature changes rapidly and sharp freezes occur, but extremes of temperature and maximum fluctuations in temperature are more frequent in spring than at other times. Table 1, compiled from records of the U.S. Weather Bureau at Mondovi, gives climatic data for the county. Mondovi is in the northeastern part of the county.

At Mondovi, the average temperature in winter is about 17 degrees, and the average temperature in summer is about 69 degrees, but wide variations occur from day to day. The temperature in winter often drops to below zero, and the temperature in summer often rises to above 90° F. Extremes in temperature, ranging from 29° F. to 110°, have been recorded in summer. Temperatures ranging from 64° F. to −45° have been recorded in winter.

[1] Other soil scientists who assisted with fieldwork in Buffalo County were M. H. Gallatin, A. H. Simerson, W. E. Hains, B. S. Butman, R. A. Erickson, J. P. McCauley, M. A. Marchant, T. J. Keller, D. E. Herish, S. W. Torrance, W. W. Carter, R. J. Arkley, G. E. Kintner, S. E. Wikle, M. R. Stimac, T. C. Bass, R. J. Bartelme, and Emil W. Evenson.

TABLE 1.—*Temperature and precipitation at Mondovi, Buffalo County, Wis.*

[Elevation, 738 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1910)	Wettest year (1926)	Average snowfall
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
January	12. 2	56	−45	1. 12	0. 95	2. 22	10. 7
February	16. 6	64	−43	1. 13	. 15	1. 98	8. 4
March	29. 5	81	−33	1. 84	. 01	2. 51	11. 4
April	44. 4	92	−5	2. 65	1. 10	2. 09	3. 5
May	56. 9	108	20	3. 64	3. 00	3. 55	. 3
June	66. 1	102	29	5. 23	. 31	2. 38	0
July	71. 5	110	37	3. 40	1. 99	9. 74	(3)
August	68. 2	104	33	3. 59	4. 34	3. 36	0
September	60. 5	100	21	3. 95	1. 95	7. 90	(3)
October	48. 0	88	8	2. 12	. 83	1. 74	. 6
November	33. 6	78	−12	1. 77	. 57	4. 81	5. 0
December	19. 5	59	−36	1. 17	. 36	2. 22	9. 8
Year	43. 9	110	−45	31. 61	15. 56	44. 50	49. 7

[1] Average temperature based on a 48-year record, through 1955; highest and lowest temperatures on a 38-year record, through 1952.
[2] Average precipitation based on a 47-year record, through 1955; wettest and driest years based on a 36-year record, in the period 1908–1955; snowfall based on a 36-year record, through 1952.
[3] Trace.

Such extremes of temperature are rare, however, and do not last long.

The average frost-free period at Mondovi is 141 days and generally extends from about May 11 to September 29. This period is long enough so that many different kinds of crops can be grown. The shortest growing season reported for this area was only 110 days, and the longest was 197 days. The last killing frost in spring has been as early as April 23 and as late as June 6.

In areas at higher elevations and in small valleys and ravines, the growing season is somewhat shorter than that at Mondovi. The growing season in the lowland part of the county, near the Alma Weather Station (elevation 670 feet), is longer than that at Mondovi. The Alma Weather Station is near the southwestern boundary of the county, where the Mississippi River influences the temperature. In that area the last killing frost in spring is about April 27 and the first killing frost in fall is approximately October 1. As a result, the growing season is 10 days to 2 weeks longer than in other parts of the county.

The average annual precipitation at Mondovi is approximately 31 inches, and that at the Alma Weather Station is approximately 29 inches. Approximately 19.5 inches, or about 62 percent, of the precipitation falls during the growing season. The season lasts from May through September, when moisture is most needed. The wettest month is June, which at Mondovi averages about 5.2 inches of precipitation, and at the Alma station, about 4.5 inches. Only about 3 inches, or 10 percent of the annual average precipitation falls during the dry, cold months of December, January, and February. However, approximately 58 percent of the average annual snowfall, which is about 50 inches, falls during that period.

The total rainfall recorded at the Mondovi station normally varies only moderately from year to year. The Weather Bureau records show, however, that a low of 15.56 inches was recorded for the year 1910, and a high of 44.50 inches, for the year 1926. Usually, there is 26 to 32 inches of rainfall during the year.

The total annual rainfall at Alma for the years 1937 to 1952 shows less variation than at the Mondovi station. At the Alma station, only 19.12 inches of precipitation was recorded in 1949, and 43.87 inches was recorded in 1938. The long-time averages of the two stations, however, closely approximate one another. Severe droughts rarely occur, but yields of crops are lowered by short periods of dry weather when temperatures are high. This is especially true on the more shallow and sandy soils of the county.

Most of the precipitation in summer falls in the form of showers, but occasionally there are violent rainstorms, sometimes accompanied by high winds. When these occur, the convex slopes of unprotected, silty benchlands and ridgetops, as well as sloping, sandy soils, are subject to severe sheet, rill, and gully erosion.

Buffalo County lies within the belt of prevailing westerly winds. The winds bring general storms eastward and northeastward into the county. Winds from the southwest bring most of the rain in spring, summer, and autumn. In summer, winds rarely attain a high velocity, and, therefore, they seldom damage soils or crops seriously. In winter, however, stronger winds blow in from the northwest, often bringing low temperatures with them. These winds, like the winds in summer, are seldom destructive. This county is slightly south of the tornado belt that extends through Polk, St. Croix, and Pierce Counties eastward to Lincoln and Marathon Counties.

Buffalo County receives an average of 56 percent of all possible sunshine each year. Much of the sunshine is in summer.

The annual average relative humidity for the county is fairly close to that shown for the State as a whole. Records kept by the U.S. Weather Bureau show average humidities of 80 percent at 7:00 a.m., 64 at noon, and 70 at 7:00 p.m. These percentages are somewhat higher in winter than in summer.

Vegetation

According to records kept by the early surveyors, forests once covered approximately 67 percent of the area that is now Buffalo County. In addition, there were scattered areas of prairie vegetation and of forest-prairie transitional vegetation. The forests consisted mainly of black, white, red, and bur oaks and of other hardwoods.

The timbered areas were mainly on ridges and on steep valley slopes. The areas covered by grass were mainly on nearly level to undulating benches along the Mississippi River and its tributaries and on gentle valley slopes. The areas covered by semiprairie vegetation were called oak openings. They were mainly on broad ridges in the uplands, where the vegetation consisted mostly of thin stands of oak, interspersed with areas covered by prairie grass.

Before the land was cultivated, forests probably extended into the prairies. The rate of extension was doubtless retarded by fires, started by lightning or set by the Indians to hold back the forests so that the openings could be kept for their campsites and for crops. Also, the prairie areas in the valleys probably were burned over each year.

Nearly all of the land suitable for cultivation is now used for crops or pasture. An additional limited acreage of woodland could be cleared, and a small acreage of wet land could be cultivated if it were drained. Some of the steeper and eroded areas and areas where the soils are thin should be reforested and taken out of cultivation.

Physiography, Geology, and Drainage

Most of Buffalo County lies within the unglaciated part of western Wisconsin, although a small area in the northwestern corner is shown on some maps as having been glaciated. In the area that may have been glaciated, only a few small, rounded pebbles on the ridgetops remain as evidence of glaciation.

The county has many high ridges and steep escarpments (fig. 2). It is dissected by streams that are bordered by bottom lands, or flood plains. The lowest part of the county, the flood plain of the Mississippi River in the extreme southern part of the county, has an elevation of about 650 feet.

Farther back from the streams and along the edges of the flood plains are the stream terraces. The highest terraces are in the valley of Bear Creek in the northern end of the county. They rise to an elevation of approximately 900 feet.

The relief of the county and, to a large extent, the kinds of soils and their distribution have been influenced greatly by the kind of bedrock. Prairie du Chien (Lower Magnesian) dolomite and Cambrian sandstone—Trempealeau, Franconia, and Dresbach formations—make up the larger part of the bedrock that underlies Buffalo County. A few thin, scattered remnants of St. Peter sandstone overlie the dolomite on the highest ridgetops in the northwestern part of the county. The limestone is harder than the sandstone and is more resistant to erosion. It is the principal bedrock making up the ridges.

In the Cambrian sandstone the uppermost layer consists of sandstone of the Trempealeau formation. It overlies the Franconia formation, which is made up of shaly, greenish sandstone that contains a large amount of glauconite. Sandstone of the Dresbach formation makes up the lowest layer.

Because Buffalo County was not covered by glacial material, or at least not so recently as other parts of the State, erosion of the limestone and sandstone bedrock has taken place over a long period of geologic time. At one time the Prairie du Chien dolomite extended as a plateau much farther north than it does now. Gradually, however, erosion cut through the hard limestone into the softer layers of sandstone and formed deep valleys.

As the underlying sandstone also became eroded, the limestone caprock continued to break off and waste back until some areas became completely devoid of limestone. This was true of the steep areas around the edges of the area indicated as association 1 on the soil association map, page 5, and of the areas indicated as associations 2 and 3, also shown on that map. The tops of these steep areas are now lower than the limestone ridges in the rest of the county.

The relatively soft sandstone of the Dresbach formation, which underlies the Boone and Hixton soils of soil association 3, is now in an advanced stage of geologic erosion. Adjacent to the valleys of streams, the low uplands underlain by sandstone of the Dresbach formation merge gradually with the sandy terraces that are back from the streams.

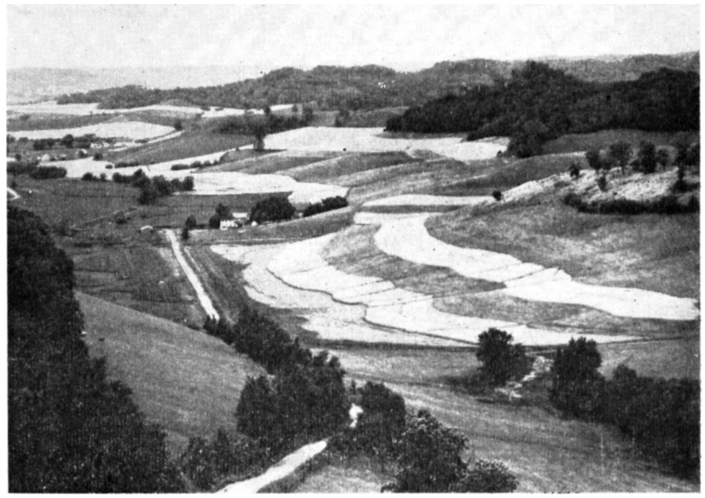

Figure 2.—**Landscape showing typical topographic features of the county. Upland ridges are visible in the background.**

The areas underlain by limestone are dissected by the many streams that flow between the limestone ridges. The elevation of the limestone ridges ranges from approximately 1,100 to 1,300 feet. In many places the floors of the valleys are as much as 500 feet below the tops of the ridges.

Because the Prairie du Chien caprock resisted the forces of erosion, the escarpments and the sides of the valleys are steep. The bluffs along the sides of the valleys are made up of the various layers of bedrock. The Prairie du Chien limestone and Trempealeau sandstone in most places form rather abrupt escarpments. The shaly, greenish Franconia sandstone, which overlies sandstone of the Dresbach formation, forms narrow, steep, intermediate ridges. Below the ridges and leading to the floors of the valleys, the sides of the valleys are less steep and have been covered by a layer of silt.

All of the uplands and many of the terraces along streams have been covered by a mantle of silt, or loess. In some places, however, the silt capping has eroded away and left exposed materials weathered from the underlying bedrock. The silt is believed to have come from material that was ground to fine particles by the glaciers. It was deposited by glacial melt water on the bottoms along the Mississippi River when the glaciers receded. Westerly winds then picked it up and spread it over the area that is now Buffalo County.

The layer of silt ranges in thickness from more than 10 feet on the ridges adjacent to the Mississippi River to less than 1 foot in areas more distant from the river. The silt was probably calcareous at the time it was deposited. As the result of weathering, however, it is now leached of free carbonates to a depth of 5 feet or more. This silt, or loess, is the parent material for many soils in the county.

The materials that make up the terraces along streams were derived from three sources: (1) From sand that originated in the northern part of Wisconsin and was carried by glacial melt water and then by the Mississippi and Chippewa Rivers to its present location; (2) sand weathered from sandstone bedrock in place; and (3) windblown silt.

Buffalo County drains to the Mississippi River. The Chippewa River, which forms part of the western boundary of the county, drains the northwestern part. In addition, the Buffalo River and Waumandee Creek drain the interior part of the county, and the Trempealeau River drains a small area in the southeastern part.

According to Martin (*5*),[2] it is probable that the Buffalo River once flowed west and entered the Chippewa River just north of the area now occupied by the city of Durand. One theory is that, during the glacial period, the river channel was partially blocked at its western end by glacial ice in the valley of the Chippewa River and was thus forced to seek a southward course toward the area now occupied by the city of Alma.

Another theory is that a smaller stream once flowed in the narrow valley south of what is now the city of Mondovi. Through the process of headwater erosion, it eventually intercepted the Buffalo River at the point where the Buffalo River now turns south near Mondovi. The broad flood plain and the marsh along Bear Creek are products of a larger stream than those now flowing through the area. This area is flat and has a slope divide near the Mondovi-Canton Town line. Bear Creek now drains this area to the west, and Harvey Creek drains it to the east.

Soil Associations

In a county or other large tract, it is easy to see differences as one travels from place to place. There are differences in the steepness, length, and shape of slopes; in the size and speed of the streams; in the kinds of native plants; and in the ways the soils are farmed or otherwise used. Along with the differences that are easy to see, there are many differences in the kinds of soils. The characteristics of the soils influence the kind of farming and other uses that can be made of the land.

After studying the soils and the way they are arranged, it is possible to make a general map that shows the principal patterns, or associations, of soils. Such a map is shown in figure 3, which also shows relief. A colored general soil map, which also shows the principal patterns, or soil associations in the county, is given in the back of this report.

As a rule, a general soil area, or soil association, contains a few major soils and several minor soils in a pattern that is characteristic, although not strictly uniform. The soils within any one association are likely to differ greatly among themselves in some properties, for example, in slope, depth, stoniness, or natural drainage. Thus, the general map does not show the kind of soil at any particular place, but a pattern that has in it several kinds of different soils. The general map is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the location of large areas suitable for a certain kind of farming or other land use.

[2] Italic numbers in parentheses refer to Literature Cited, p. 98.

Association 1

Silty soils of the rolling limestone uplands and Steep stony and rocky land: Dubuque, Fayette, Steep stony and rocky land

This association is the largest and most uniform in the county. Except for a small acreage of other soils in the northeastern part of the county and a small acreage in the valley of the Buffalo River and near Waumandee Creek, it extends unbroken from the northern boundary of the county to the southernmost tip.

The principal soils on uplands in this association are the Dubuque and Fayette, but the Downs soils are also extensive. The principal soils on escarpments are steep to very steep Urne-Norden loams and Steep stony and rocky land. The association also includes areas of sloping to steep Fayette valleys soils and areas of Lindstrom and Norden soils. In addition, there are a few small areas of Boone, Hesch, Hixton, and Gale soils. The soils of uplands are on rolling, silt-capped ridges. They are underlain by dolomitic limestone or by materials weathered from limestone, which are at a depth of 1 to 10 feet.

For the most part, the Dubuque soils and the sloping to steep Fayette soils are on the narrower ridges. The Dubuque soils are underlain by cherty red clay and by dolomitic limestone, which is at a depth of 12 to 42 inches. The gently sloping Fayette soils and the Downs soils are on the broader ridgetops. The Fayette and Downs soils formed in silt that is thicker than 42 inches.

The Dubuque and Fayette soils formed under timber. The Downs soils, mainly on the broad Alma Ridge, formed under vegetation consisting of a sparse stand of trees and prairie grasses.

Because of its size and extent, this association is more important for agriculture than the other associations of the county. This association has the largest acreage of soils under cultivation; it also has the largest acreage in pasture and trees. The soils in this association are potentially highly productive, but, if they are not managed properly, they are likely to be damaged by water erosion.

Association 2

Loamy soils of the rolling to hilly sandstone uplands: Gale, Hixton

This soil association is mostly in the northeastern part of the county. It is made up mainly of rolling and hilly soils that are underlain by sandstone. The principal soils are those of the Gale and Hixton series, but areas of Urne-Norden loams and of Norden and Fayette soils are included. The soils formed under forest. The Gale soils formed in a blanket of silty, wind-laid loess that overlies sandstone. The Hixton soils formed from materials weathered from sandstone.

The soils of this association have slightly lower relief than those in association 1. In most places in the association, the sandstone has weathered so that the hilltops are rounded, but there are a few higher, sharp ridges and knobs formed from green, shaly sandstone. The Norden soils and the Urne-Norden loams occupy these higher areas.

In general, the soils of this association have stronger slopes and are lower in moisture-storing capacity and

Figure 3.—Soil associations and relief in Buffalo County.

1. Silty soils of the rolling limestone uplands and Steep stony and rocky land: Dubuque, Fayette, Steep stony and rocky land.
2. Loamy soils of the rolling to hilly sandstone uplands: Gale, Hixton.
3. Sandy soils of the rolling to hilly sandstone uplands: Boone, Hixton.
4. Sandy soils of stream terraces: Sparta, Plainfield.
5. Silty soils of stream terraces: Bertrand, Richwood.
6. Loamy terrace soils underlain by sand on stream terraces: Meridian, Tell.
7. Wet organic and mineral soils of bottom lands: Peat and Muck, Ettrick, Wallkill.
8. Soils of overflow bottom lands: Loamy alluvial lands, Marsh.

potential productivity than the soils of association 1. They are also more likely to erode than the soils of association 1.

Association 3

Sandy soils of the rolling to hilly sandstone uplands: Boone, Hixton

This soil association is mainly on sandstone uplands in the northern part of the county. The areas are largely rolling to hilly but include areas that are very steep. Boone soils and Hixton fine sandy loams are more extensive than other soils in the association, but finer textured soils, such as Gale silt loams, Hixton loams, Urne-Norden loams, Norden soils, and areas of Alluvial lands are also included.

The soils of both the Boone and Hixton series formed in materials weathered from sandstone. The Boone soils, however, contain less fine material in the surface layer and subsoil than the Hixton soils.

Like the hilltops in association 2, the hilltops in this association are generally rounded. There are a few high knobs or sharp ridges formed from green, shaly, glauconitic sandstone. Soils of the Norden series and Urne-Norden loams are on these high areas. Except for a few small areas, the narrow stream bottoms within the association are occupied by Alluvial lands, which are too wet or flood too frequently to be suitable for crops. All of the soils of association 3, except the soils on ridges and knobs, occur at lower elevations than the soils of association 2.

Their sandy texture causes the soils of this association to be low in moisture-storing capacity. The soils are also low in fertility and are easily eroded by wind and water.

Association 4

Sandy soils of stream terraces: Sparta, Plainfield

This soil association is made up mainly of nearly level to rolling soils formed in sand that was transported by streams. Some of the soils formed under timber, and others, under prairie vegetation. The principal soils are the Sparta and Plainfield, but areas of Hubbard, Burkhardt, Gotham, Trempe, Meridian, and Dakota soils, and areas of Alluvial lands are also included.

Most of the soils in this association are on terraces along the streams throughout the county. The Burkhardt soils, however, occur mainly on the broad, gravelly and sandy terraces along the Mississippi River, between Buffalo City and Cochrane. The Trempe soils occur only along the Buffalo River in an area near Mondovi, and they extend eastward to the county line. The areas of Alluvial lands are in the narrow valleys of streams. They are wet or are flooded frequently.

In the main the stream benches, or terraces, in this association are not so high above the flood plain as other stream terraces in the county. Nevertheless, they have rather steep, well-defined escarpments. The soils on the escarpments are subject to serious gullying if they are not protected.

The soils of this association are generally droughty and are low in productivity. They are subject to severe erosion by wind.

Association 5

Silty soils of stream terraces: Bertrand, Richwood

This soil association consists of deep, silty soils, mainly on benches, or terraces, along streams. The soils are nearly level to sloping. The principal soils are the Bertrand and Richwood, but soils of the Jackson, Curran, Toddville, and Rowley series are also extensive. Of these, the Bertrand and Richwood soils are well drained; the Jackson and Toddville, moderately well drained; and the Curran and Rowley, somewhat poorly drained. Included in the association are small areas of silty soils of bottom lands. The silty soils range in drainage from well drained to poorly drained.

In general, the soils of this association are highly productive if they are managed properly, and they respond well to management. The most extensive soils in the association are the most productive of any of the soils on terraces in the county. The soils commonly occur in fairly large areas and generally have mild relief. Therefore, they can be cultivated easily.

The Curran and Rowley soils and some of the soils on bottom lands require drainage or protection from flooding if crops are to make good yields. The soils that have the strongest slopes are likely to erode if they are not protected. The strongly sloping soils, along the edges of the high benches, are susceptible to serious gullying.

Association 6

Loamy soils underlain by sand on stream terraces: Meridian, Tell

This soil association consists mainly of nearly level to sloping, loamy soils on terraces along streams. The soils are chiefly along the Buffalo River. The principal soils are the Meridian and Tell, and Medary soils occur to a lesser extent. Areas of Alluvial lands are also included. The Meridian and Tell soils are well drained, and the Medary soils are moderately well drained to well drained. At a depth between 24 and 36 inches, the Meridian and Tell soils are underlain by sand that has been transported by water. The Medary soils differ from the Meridian and Tell soils in having developed in reddish, water-laid silts and clays. They occur near the boundary of this association in Alma Township.

Except for the Medary soils and areas of Alluvial lands, the soils in this association are lower in moisture-storing capacity than the soils in association 5. Runoff varies according to the steepness of slope and the amount of water that flows off the adjacent uplands.

Along the edges of the high terraces, gullying has been severe and slumping is a serious problem. As a result, a large amount of sediment has been deposited in the valleys below the terraces.

Association 7

Wet organic and mineral soils of bottom lands: Peat and Muck, Ettrick, Wallkill

The soils of this association are poorly drained. The principal soils are Peat and Muck and the Ettrick and Wallkill soils. These soils occur on flats or in depressions along streams. They are subject to flooding, but they are highly productive if they are drained and well managed.

Minor areas in the association are occupied by soils of the Meridian and Granby series. The Meridian and Granby soils are on low benches along the edges of the association.

Association 8

Soils of overflow bottom lands: Loamy alluvial lands, Marsh

Most of the association is made up of areas of Loamy alluvial lands and Marsh. The soils vary greatly from place to place. They are on bottom lands, where they are flooded frequently. The soils have formed in alluvium recently deposited by streams.

Arenzville and Orion soils occupy a minor acreage in the association. These soils are flooded less frequently than other soils in the association and are desirable for agriculture. The Arenzville and Orion soils are mainly along the Trempealeau River. These soils and the better drained areas of the Loamy alluvial lands are fair to good for crops if they are managed properly. The soils in the rest of the association can be used only for pasture, as woodland, or for wildlife.

Descriptions of Soils

Described briefly in this section are the soil series, which are groups of soils that are much alike, and the mapping units that are shown on the soil map at the back of the report. Terms used to describe the soil series and mapping units are defined in the Glossary. The approximate acreage and proportionate extent of each mapping unit are given in table 2.

In the back of the report, a detailed profile is described for each soil series. A soil profile is a vertical section of a soil showing its various layers. A diagram of a typical profile of several of the major soils in the county is given in figure 4. Figure 4 also shows the position occupied by the soils and the material underlying them.

By studying the soil profile, soil scientists learn much about the behavior of soils. Following are some of the characteristics observed that are agriculturally important.

Color and content of organic matter.—Some of the soils in Buffalo County have a surface layer that is naturally dark colored. In others the color of the surface layer is light. Originally, this difference was caused by the kind of vegetation that grew on the soils when they were forming. Soils formed under prairie grasses generally have a dark-colored surface layer because the grasses have added organic matter to the soil. In contrast, the surface layer of soils formed under trees is light colored because less organic matter has been added to the soil by trees. The soils that have a dark, thick surface layer have always been prized by farmers because they can be worked readily into excellent seedbeds.

Originally, the dark-colored soils were more fertile than the light-colored ones, but now, after having been cropped for approximately 100 years, the light-colored and dark-colored soils are nearly equal in fertility. Nevertheless, even after many years of cropping, the soils that formed from similar materials and that have a dark surface layer are still slightly more productive than the lighter colored soils. This is the result of the binding, or aggregating, effect of the dark organic matter. Both light-colored and dark-colored soils, however, need fresh supplies of organic matter. This can be supplied by turning under crop residues and barnyard manure or green manure.

In this report the color of the soil is described in two ways. First, it is indicated by a descriptive term. Then, in the more detailed soil descriptions in the back of the report, it is also indicated by a Munsell notation, such as (10YR 5/2). The Munsell notation denotes color more precisely than is possible by the use of words. Unless otherwise stated the color given is that of moist soil.

Depth.—The depth, or thickness, of a soil is important because it determines in large part how much moisture the soil retains and can thus supply to plants. In many of the soils in Buffalo County, the soil materials are favorable to a depth of 3 feet or more for retention of moisture. During years of normal rainfall, the supply of moisture is adequate for plants to grow well. In other soils in Buffalo County, bedrock or unfavorable soil materials are at a depth of less than 3 feet. Even though the surface layer or upper part of the soil may be loamy, these soils are limited in their capacity to supply moisture to plants. During years of low rainfall or if rainfall is poorly distributed during the growing season, plants growing on these shallow soils are more likely to be damaged by drought than those growing on the soils that have a depth greater than 3 feet.

Texture.—The texture of the soils in this county ranges from sandy to clayey, but silty and sandy soils are predominant. Well-drained, nearly level, silty soils require only such management practices as careful use of tillage implements, the addition of barnyard manure, and the use of sod crops in the cropping system to keep them in good tilth. Sandy soils, however, need special management because they are likely to be droughty and have limited use for crops. They contain only a small amount of the finer soil material that binds soil particles together, and, therefore, they are more susceptible to erosion than silty soils. In contrast to the sandy soils, the nearly level, clayey soils generally hold an excess of water. As a result, plants growing on clayey soils are often damaged because they do not get enough air.

Consistence.—The consistence of a soil is closely related to its texture. By consistence is meant the feel of the soil material when the soil is rubbed between the fingers. Examples of terms used to describe consistence are "friable," to describe consistence when the soil is moist; "plastic," to describe consistence when the soil is wet; and "hard," to describe consistence when the soil is dry. Other terms used to describe consistence are defined in the Glossary. Most soils that have a silty texture and granular structure also are friable. A friable soil is more desirable for agriculture than one that is firm, very firm, or loose. It can be worked easily, and generally it will make a good seedbed.

Structure.—Structure is the way individual particles are arranged, or grouped, in larger aggregates. The soil aggregates may be granular, blocky, or platelike, or they may have other forms. The size of the aggregates, their shape, and the pore space between them determine how well water and air move through the soil. This, in turn, determines how easily plant roots can develop and penetrate the soil.

TABLE 2.—*Approximate acreage and proportionate extent of the soils mapped*

Soil	Acres	Percent
Arenzville silt loam	4,000	0.9
Bertrand silt loam, 2 to 6 percent slopes	2,420	.5
Bertrand silt loam, 0 to 2 percent slopes	6,000	1.3
Bertrand silt loam, 2 to 6 percent slopes, moderately eroded	3,648	.8
Bertrand silt loam, 6 to 12 percent slopes	250	.1
Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	1,000	.2
Boone fine sand, 2 to 6 percent slopes, eroded	2,600	.6
Boone fine sand, 6 to 12 percent slopes, eroded	4,000	.9
Boone fine sand, 12 to 40 percent slopes, eroded	8,987	2.0
Burkhardt sandy loam, 2 to 6 percent slopes	450	.1
Burkhardt sandy loam, 0 to 2 percent slopes	400	.1
Burkhardt sandy loam, 6 to 12 percent slopes, moderately eroded	41	(1)
Chaseburg silt loam, 2 to 6 percent slopes	2,758	.6
Chaseburg silt loam, 0 to 2 percent slopes	613	.1
Chaseburg silt loam, 6 to 12 percent slopes	703	.2
Curran silt loam	440	.1
Dakota loam, 0 to 2 percent slopes	320	.1
Dakota loam, 2 to 6 percent slopes	679	.1
Dakota fine sandy loam, 0 to 2 percent slopes	450	.1
Dakota fine sandy loam, 2 to 6 percent slopes	600	.1
Dakota fine sandy loam, 2 to 6 percent slopes, moderately eroded	120	(1)
Downs silt loam, 2 to 6 percent slopes	300	.1
Downs silt loam, 2 to 6 percent slopes, moderately eroded	2,500	.5
Downs silt loam, 6 to 12 percent slopes, moderately eroded	800	.2
Downs silt loam, benches, 2 to 6 percent slopes	350	.1
Downs silt loam, benches, 6 to 12 percent slopes, moderately eroded	550	.1
Downs silt loam, benches, 12 to 20 percent slopes, moderately eroded	925	.2
Dubuque silt loam, 6 to 12 percent slopes, moderately eroded	2,500	.5
Dubuque silt loam, 2 to 6 percent slopes	726	.2
Dubuque silt loam, 2 to 6 percent slopes, moderately eroded	450	.1
Dubuque silt loam, 6 to 12 percent slopes	768	.2
Dubuque silt loam, 12 to 20 percent slopes	1,400	.3
Dubuque silt loam, 12 to 20 percent slopes, moderately eroded	1,895	.4
Dubuque silt loam, 20 to 30 percent slopes	2,500	.5
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded	800	.2
Dubuque silt loam, 30 to 40 percent slopes, eroded	1,803	.4
Dubuque soils, 6 to 12 percent slopes, severely eroded	300	.1
Dubuque soils, 12 to 20 percent slopes, severely eroded	829	.2
Dubuque soils, 20 to 30 percent slopes, severely eroded	423	.1
Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded	3,000	.7
Dubuque silt loam, deep, 2 to 6 percent slopes	1,000	.2
Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	2,000	.4
Dubuque silt loam, deep, 6 to 12 percent slopes	869	.2
Dubuque soils, deep, 6 to 12 percent slopes, severely eroded	400	.1
Dubuque silt loam, deep, 12 to 20 percent slopes	3,168	.7
Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded	3,200	.7
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded	600	.1
Dubuque silt loam, deep, 20 to 30 percent slopes	3,744	.8
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately and severely eroded	1,100	.2
Duelm fine sandy loam	150	(1)
Duelm fine sandy loam, high water table	485	0.1
Ettrick silt loam	2,497	.5
Ettrick silt loam, sandy substratum	1,800	.4
Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded	13,394	2.9
Fayette silt loam, uplands, 2 to 6 percent slopes	2,221	.5
Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded	5,000	1.1
Fayette silt loam, uplands, 6 to 12 percent slopes	2,700	.6
Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded	2,000	.4
Fayette silt loam, uplands, 12 to 20 percent slopes	3,200	.7
Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded	9,000	2.0
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded	1,200	.3
Fayette silt loam, uplands, 20 to 30 percent slopes	617	.1
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded	646	.1
Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded	317	.1
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	10,000	2.2
Fayette silt loam, valleys, 2 to 6 percent slopes	600	.1
Fayette silt loam, valleys, 6 to 12 percent slopes	231	.1
Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	5,376	1.2
Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded	300	.1
Fayette silt loam, valleys, 12 to 20 percent slopes	600	.1
Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	11,088	2.4
Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded	2,400	.5
Fayette silt loam, valleys, 20 to 30 percent slopes	4,000	.9
Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded	1,800	.4
Gale silt loam, 12 to 20 percent slopes, moderately eroded	2,582	.6
Gale silt loam, 2 to 6 percent slopes, moderately eroded	266	.1
Gale silt loam, 6 to 12 percent slopes, moderately eroded	540	.1
Gale silt loam, 6 to 12 percent slopes, severely eroded	328	.1
Gale silt loam, 12 to 20 percent slopes	1,175	.3
Gale silt loam, 12 to 20 percent slopes, severely eroded	400	.1
Gale silt loam, 20 to 30 percent slopes	739	.2
Gale silt loam, 20 to 30 percent slopes, moderately eroded	1,161	.3
Gale silt loam, 20 to 30 percent slopes, severely eroded	500	.1
Gotham loamy fine sand, 2 to 6 percent slopes	490	.1
Gotham loamy fine sand, 2 to 6 percent slopes, eroded	210	(1)
Gotham loamy fine sand, 0 to 2 percent slopes	120	(1)
Granby sandy loam	235	.1
Granby fine sandy loam, stratified substratum variant	160	(1)
Gullied land	300	.1
Hesch loam, 12 to 20 percent slopes, moderately eroded	600	.1
Hesch loam, 6 to 12 percent slopes, moderately eroded	200	(1)

See footnote at end of table.

TABLE 2.—*Approximate acreage and proportionate extent of the soils mapped*—Continued

Soil	Acres	Percent
Hesch loam, 20 to 30 percent slopes	110	(1)
Hesch loam, 20 to 30 percent slopes, moderately eroded	200	(1)
Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded	330	0. 1
Hesch fine sandy loam, 2 to 6 percent slopes	92	(1)
Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded	200	(1)
Hesch fine sandy loam, 20 to 30 percent slopes	132	(1)
Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded	138	(1)
Hixton loam, 12 to 20 percent slopes, moderately eroded	1, 900	. 4
Hixton loam, 2 to 6 percent slopes	234	. 1
Hixton loam, 2 to 6 percent slopes, moderately eroded	700	. 2
Hixton loam, 6 to 12 percent slopes	260	. 1
Hixton loam, 6 to 12 percent slopes, moderately eroded	1, 100	. 2
Hixton loam, 6 to 12 percent slopes, severely eroded	150	(1)
Hixton loam, 12 to 20 percent slopes	500	. 1
Hixton loam, 12 to 20 percent slopes, severely eroded	400	. 1
Hixton loam and fine sandy loam, 20 to 30 percent slopes	3, 609	. 8
Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded	4, 694	1. 0
Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded	1, 100	. 2
Hixton loam and fine sandy loam, 30 to 40 percent slopes	3, 200	. 7
Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded	4, 000	. 9
Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded	1, 900	. 4
Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 200	. 3
Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded	3, 771	. 8
Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded	425	. 1
Hixton fine sandy loam, 12 to 20 percent slopes	620	. 1
Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded	700	. 2
Hubbard soils, 0 to 2 percent slopes	775	. 2
Hubbard soils, 2 to 6 percent slopes	490	. 1
Huntsville silt loam	1, 191	. 3
Jackson silt loam, 0 to 2 percent slopes	2, 100	. 5
Jackson silt loam, 2 to 6 percent slopes	640	. 1
Jackson silt loam, 2 to 6 percent slopes, moderately eroded	1, 100	. 2
Judson silt loam, 2 to 6 percent slopes	3, 668	. 8
Judson silt loam, 0 to 2 percent slopes	610	. 1
Judson silt loam, 6 to 12 percent slopes	1, 152	. 3
Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	4, 045	. 9
Lindstrom silt loam, 6 to 12 percent slopes	1, 000	. 2
Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	4, 128	. 9
Lindstrom silt loam, 20 to 30 percent slopes	300	. 1
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	895	. 2
Loamy alluvial land	6, 700	1. 5
Loamy alluvial land, poorly drained	13, 000	2. 9
Marsh	11, 000	2. 4
Medary silt loam, 0 to 2 percent slopes	100	(1)
Medary silt loam, 2 to 6 percent slopes, moderately eroded	88	(1)
Meridian loam, 0 to 2 percent slopes	1, 100	. 2
Meridian loam, 2 to 6 percent slopes	612	. 1
Meridian loam, 2 to 6 percent slopes, moderately eroded	600	. 1
Meridian loam, 6 to 12 percent slopes, moderately eroded	900	0. 2
Meridian fine sandy loam, 0 to 2 percent slopes	1, 200	. 2
Meridian fine sandy loam, 2 to 6 percent slopes	1, 100	. 3
Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 225	. 3
Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded	528	. 1
Meridian loam, moderately well drained variant, 0 to 2 percent slopes	300	. 1
Meridian loam, moderately well drained variant, 2 to 6 percent slopes	170	(1)
Norden loam, 12 to 20 percent slopes, moderately eroded	2, 100	. 5
Norden loam, 6 to 12 percent slopes	110	(1)
Norden loam, 6 to 12 percent slopes, moderately eroded	450	. 1
Norden loam, 20 to 30 percent slopes, moderately eroded	7, 000	1. 5
Norden silt loam, 12 to 20 percent slopes, moderately eroded	2, 938	. 6
Norden silt loam, 6 to 12 percent slopes, moderately eroded	760	. 2
Norden silt loam, 12 to 20 percent slopes	600	. 1
Norden silt loam, 12 to 20 percent slopes, severely eroded	500	. 1
Norden silt loam, 20 to 30 percent slopes	4, 000	. 9
Norden silt loam, 20 to 30 percent slopes, moderately eroded	5, 700	1. 3
Norden silt loam, 20 to 30 percent slopes, severely eroded	1, 536	. 3
Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded	2, 074	. 5
Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded	192	(1)
Norden fine sandy loam, 6 to 12 percent slopes, moderately eroded	624	. 1
Norden fine sandy loam, 12 to 20 percent slopes	446	. 1
Norden fine sandy loam, 12 to 20 percent slopes, severely eroded	1, 500	. 3
Orion silt loam	454	. 1
Peat and Muck, deep	4, 500	1. 0
Peat and Muck, shallow	1, 200	. 3
Plainfield loamy fine sand, 2 to 6 percent slopes	2, 231	. 5
Plainfield loamy fine sand, 0 to 2 percent slopes	800	. 2
Plainfield loamy fine sand, 2 to 6 percent slopes, eroded	1, 137	. 2
Plainfield loamy fine sand, 6 to 12 percent slopes, eroded	786	. 2
Plainfield loamy fine sand, loamy substrata variant	200	(1)
Richwood silt loam, 0 to 2 percent slopes	3, 234	. 7
Richwood silt loam, 2 to 6 percent slopes	2, 497	. 5
Richwood silt loam, 6 to 12 percent slopes, moderately eroded	185	(1)
Riverwash	278	. 1
Rowley silt loam	2, 500	. 5
Sandy alluvial land	2, 000	. 4
Sandy alluvial land, poorly drained	18, 288	4. 0
Sparta loamy fine sand, 2 to 6 percent slopes	5, 018	1. 1
Sparta loamy fine sand, 0 to 2 percent slopes	1, 440	. 3
Sparta loamy fine sand, 2 to 6 percent slopes, eroded	1, 700	. 4
Sparta loamy fine sand, 6 to 12 percent slopes	521	. 1
Sparta loamy fine sand, 6 to 12 percent slopes, eroded	996	. 2
Sparta loamy fine sand, loamy substrata variant	200	(1)
Sparta and Plainfield fine sands and Dune land	1, 800	. 4
Steep stony and rocky land	47, 013	10. 3
Tell silt loam, 2 to 6 percent slopes	1, 800	. 4
Tell silt loam, 0 to 2 percent slopes	900	. 2

See footnote at end of table.

TABLE 2.—*Approximate acreage and proportionate extent of the soils mapped*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Terrace escarpments, loamy	9, 163	2. 0	Urne-Norden loams, 20 to 30 percent slopes	2, 500	0. 5
Terrace escarpments, sandy	8, 751	1. 9	Urne-Norden loams, 20 to 30 percent slopes, moderately eroded	6, 668	1. 5
Toddville silt loam, 0 to 2 percent slopes	950	. 2	Urne-Norden loams, 30 to 40 percent slopes, moderately eroded	2, 500	. 5
Toddville silt loam, 2 to 6 percent slopes	400	. 1	Wallkill silt loam	1, 800	. 4
Trempe loamy fine sand, 0 to 2 percent slopes	420	. 1	Waukegan silt loam, 0 to 2 percent slopes	607	. 1
Trempe loamy fine sand, 2 to 6 percent slopes	278	. 1	Waukegan silt loam, 2 to 6 percent slopes	550	. 1
Trempe loamy fine sand, 2 to 6 percent slopes, eroded	300	. 1	Total	455, 680	[1] 99. 4
Trempe loamy fine sand, 6 to 12 percent slopes, eroded	196	([1])			
Urne-Norden loams, 30 to 40 percent slopes	25, 000	5. 5			

[1] Less than 0.1 percent. Soils that have an acreage of less than 0.1 percent make up the remaining 0.6 percent of the total land area.

Unless altered by cultivation, the surface layer of most of the Buffalo County soils has granular or crumb structure. Soil layers that have a granular or crumb structure absorb and hold moisture well, and they have plentiful pore space so that soil and water can move readily through them. Soils that have a granular or crumb structure in the surface layer are easily worked and make a mellow seedbed.

Beneath the granular surface layer in the typical undisturbed soil formed under forest cover, there is a thin layer in which the structure is platy. This layer is called the A_2 horizon. In soils that have a platy structure, the aggregates consist of many, thin, platelike forms lying one on top of the other. Soils that have this type of structure lack vertical openings for easy movement of air and water, and are, therefore, less favorable for the development of roots than soils having granular structure. When forest soils are broken and tilled, the platy A_2 horizon is mixed with the upper surface layer, which has more stable, granular structure. Together these layers form a friable plow layer, called the A_p horizon.

In soils that have blocky structure, also common in soils throughout Buffalo County, the individual soil particles are grouped together in cube, or blocklike, forms. The subsoil, or B horizon, of the mature soils in the county has blocky structure. Some of the blocks have semiround surfaces, and others have flat surfaces with sharp and angular edges. Cleavage planes, or cracks, along the faces of the blocks form horizontal and vertical openings for the movement of air and water. In some soils these openings are too thin and their number is not sufficient to permit the free movement of air and water. As a result, the soil has poor internal drainage.

Soils that have blocky structure are higher in clay, but lower in organic matter, than soils having granular structure. Consequently they are harder to till.

Erosion.—Degree of erosion and susceptibility to erosion are characteristics that greatly affect the use of a soil. The amount of erosion is indicated in the names of many of the mapping units. As a rule, soils that have lost from one-third to two-thirds of the original surface layer through erosion are mapped as *moderately eroded.* Soils that have lost as much as two-thirds of their original surface layer through erosion are mapped as *severely eroded.* Eroded soils, of course, are less desirable for crops than uneroded soils. They will also need to be protected from further erosion.

Arenzville Series

The Arenzville series consists of deep soils of the bottom lands. The soils are on narrow bottoms along streams and on the broad flood plains of rivers. They developed in recent alluvium or in silt. The alluvium was transported by water and was deposited in thin layers on top of the original bottom-land soil.

The Arenzville soils are well drained to moderately well drained, but they have a few mottles in the lower part of the profile. The occasional periods when the soils are flooded seldom affect cultivation. The soils occur in association with the Orion soils and with areas of highly variable Alluvial lands. Only one soil of this series, Arenzville silt loam, is mapped in the county.

Arenzville silt loam (Ar).—This soil has a surface layer of dark grayish-brown, friable silt loam that is 6 to 12 inches thick. The subsoil consists of thin, silty layers that range from dark brown to dark gray. In places there are thin lenses of fine sand in the subsoil. A few, small mottles of brown and yellowish brown are at a depth below 12 inches.

In this soil there is the dark-colored surface layer of an old, buried soil at a depth ranging from 18 inches to several feet. This is the surface layer of the original bottom-land soil, which developed in poorly drained areas. The black, mineral surface layer of this buried soil contains a large amount of organic matter and ranges from 8 to 14 inches in thickness. Below this layer is grayish-brown silt loam that is mottled, in most places, with brown, yellow, or gray.

This nearly level soil is highly productive and is valuable as cropland. It is usually cropped intensively. Most of the acreage is used to grow corn. (Capability unit IIw-11)

Bertrand Series

The Bertrand series consists of deep, well-drained soils that have developed in silty materials. The soils occur throughout the county on high stream benches, or terraces, in association with Richwood soils. They are also closely associated with Jackson and Curran soils but are better drained than those soils. The Bertrand soils are somewhat similar to the Tell soils, but the Tell soils are underlain by sand at a depth of about 30 inches.

If the Bertrand soils are well managed, they are highly productive. Most of their acreage is cropped.

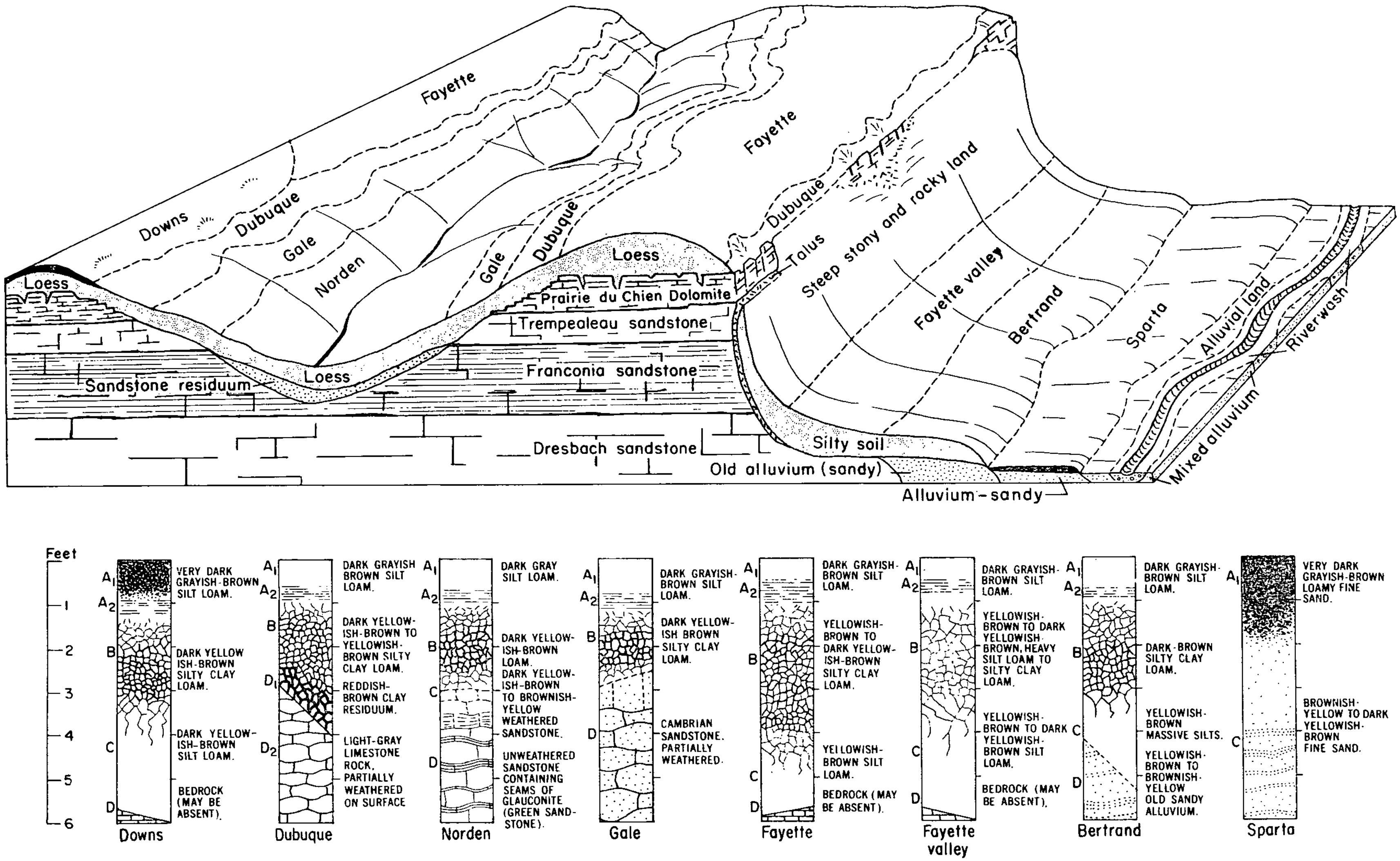

Figure 4.—**Soil landscape of Buffalo County showing relationships among major soil series.**

Bertrand silt loam, 2 to 6 percent slopes (BeB).—This soil has mild slopes and is only slightly eroded. The surface layer is dark grayish-brown or very dark grayish-brown silt loam and is 7 to 10 inches thick. The subsoil is compact silty clay loam, colored dark brown in the upper part and yellowish brown in the lower part. At a depth between 36 and 42 inches is yellowish-brown, friable silt loam. In most places the silt loam extends downward for several feet, but in a few places sand is at a depth below 42 inches. In places there are a few mottles of brown or yellowish brown below a depth of 36 inches.

Erosion is easily controlled on this soil. If suitable practices are used to control erosion, the soil is suited to intensive farming. Most of it is used for crops, mainly corn, oats, and alfalfa and bromegrass grown together for hay. (Capability unit IIe–1)

Bertrand silt loam, 0 to 2 percent slopes (BeA).—This soil is similar to Bertrand silt loam, 2 to 6 percent slopes, and it is used to grow the same kinds of crops. The soil occurs in broad, nearly level areas. If it is properly managed, it is highly productive. Except in areas that receive runoff from the nearby uplands, this soil does not require practices to control erosion. (Capability unit I–1)

Bertrand silt loam, 2 to 6 percent slopes, moderately eroded (BeB2).—This soil is more eroded than Bertrand silt loam, 2 to 6 percent slopes, and it has a thinner, slightly lighter colored surface layer. Part of the subsoil has been mixed with the surface layer by plowing, and this has given the present surface layer a lighter color than the original one. The same kinds of crops are grown on this soil as are grown on Bertrand silt loam, 2 to 6 percent slopes. (Capability unit IIe–1)

Bertrand silt loam, 6 to 12 percent slopes (BeC).—This soil is similar to Bertrand silt loam, 2 to 6 percent slopes, except that it has stronger slopes and a slightly thinner subsoil. It commonly occurs in narrow bands along the edges of terraces. Because of its location, most of this soil has remained in trees or is pastured. If the soil is cropped without careful management, it is likely to lose part of the surface layer through erosion and gullies may form. (Capability unit IIIe–1)

Bertrand silt loam, 6 to 12 percent slopes, moderately eroded (BeC2).—This soil is similar to Bertrand silt loam, 6 to 12 percent slopes, but it has a thinner surface layer. Mapped with it are a few small areas in which the soil is severely eroded. This soil is productive if it is managed properly. It needs protection from runoff to prevent further erosion or gullying. (Capability unit IIIe–1)

Boone Series

The Boone series consists of gently sloping to very steep, droughty soils on uplands underlain by sandstone. The soils are excessively drained. They are similar to the Hixton soils but are sandier and more droughty. Their solum is a few inches to several feet thick over the sandstone bedrock. The less sloping Boone soils have a thicker solum than the ones on stronger slopes because the sandstone is weathered to a greater depth. Typically, the less sloping Boone soils have a surface layer of loamy fine sand. The more strongly sloping Boone soils are shallower and have a surface layer of fine sand.

These soils are low in moisture-holding capacity and in productivity. They are susceptible to erosion by wind and water.

These soils are extensive in Buffalo County. They are mainly in the northeastern part of the county in Gilmanton, Naples, and Dover Townships.

Boone fine sand, 2 to 6 percent slopes, eroded (BoB2).—This soil has mild slopes. In places it has lost as much as two-thirds of the original surface layer through erosion. The texture of the present surface layer in some areas is loamy fine sand.

The surface layer, in a woodlot where the soil has not been disturbed, consists of loamy fine sand mixed with dark-colored organic matter. It is about 2 to 4 inches thick and contains many fine roots. The surface layer is underlain by a layer of dark yellowish-brown, slightly compact loamy fine sand that is about 4 inches thick. Beneath are successive sandy layers. These range from dark yellowish brown in the upper part of the profile to light yellowish brown at a depth of 2 to 3 feet. Partly weathered sandstone is at a depth ranging from 1 to 5 feet.

The surface layer of this soil is fairly porous, and most of the rainfall is absorbed quickly. Consequently, there is less runoff than on the finer textured, silty and clayey soils.

Most of this soil was once used as cropland. Unless there is adequate rainfall throughout the growing season, however, yields are low. The principal crops are corn, oats, red clover, and a mixture of alfalfa and bromegrass. Rye and soybeans are grown to a lesser extent. (Capability unit IVs–3)

Boone fine sand, 6 to 12 percent slopes, eroded (BoC2).—This soil has stronger slopes and a greater amount of runoff than Boone fine sand, 2 to 6 percent slopes, eroded. It is also more droughty and is more likely to be damaged seriously by wind and water.

More than two-thirds of the acreage was once used for crops. Because yields were low, many of the fields have now been converted to pasture or have been used for plantations of pine. The trees in wooded areas are mainly oaks that produce low yields. (Capability unit VIs–3)

Boone fine sand, 12 to 40 percent slopes, eroded (BoD2).—This is the most extensive of the Boone soils. The areas vary widely in slope and in degree of erosion. In some areas, especially in the more strongly sloping areas, sandstone bedrock is at a very shallow depth. In some areas most of the original surface layer has been lost through erosion. In a few places pockets of finer textured soils are included with this soil.

This is the least productive of the Boone soils. More than one-half of the acreage is in hardwoods, which produce low yields. The rest has a sparse cover of grass, is idle, or is used for crops. Many of the areas are being planted to pine. (Capability unit VIIs–6)

Burkhardt Series

The Burkhardt series consists of nearly level to gently undulating, somewhat droughty soils that have developed on sandy and gravelly stream terraces (fig. 5). The upper part of the profile has a texture of sandy loam. Layers of sand and gravel are at a depth of 18 to 24 inches.

The Burkhardt soils occur in association with Dakota, Hubbard, and Sparta soils. They are somewhat similar to the associated soils, but their subsoil is thinner and they contain more gravel.

Because of their low moisture-storing capacity, the Burkhardt soils are only moderately productive. Crops grown on them are affected quickly by drought if rainfall is not well distributed during the growing season. Nevertheless, in years when there is normal or more than the normal amount of rainfall during the growing season, corn, soybeans, and hay crops make good yields if these soils are managed properly.

In this county nearly all of the acreage of Burkhardt soils is on the broad terraces along the Mississippi River. The areas are near Buffalo City and Cochrane.

Burkhardt sandy loam, 2 to 6 percent slopes (BuB).—This soil occurs on the slopes of broad stream terraces. Its surface layer is black to very dark brown sandy loam and is about 12 inches thick. The upper part of the subsoil is very dark brown, moderately compact sandy loam that extends to a depth of 18 inches. A few pebbles occur throughout the upper part of the subsoil, but the number of pebbles increases with increasing depth. The lower part of the subsoil is dark-brown loamy sand that grades to loose sand and gravel at a depth of 24 inches.

Little water runs off this soil. Much of the rainfall is absorbed rapidly by the porous surface layer. (Capability unit IIIs-2)

Burkhardt sandy loam, 0 to 2 percent slopes (BuA).—This soil is nearly level, but in other respects it is similar to Burkhardt sandy loam, 2 to 6 percent slopes. (Capability unit IIIs-2)

Burkhardt sandy loam, 6 to 12 percent slopes, moderately eroded (BuC2).—This soil occupies a small acreage on the narrow, sloping borders of terraces. It is similar to Burkhardt sandy loam, 2 to 6 percent slopes, but it has stronger slopes, a thinner surface layer and subsoil, and lower moisture-storing capacity. This soil is the least productive of the Burkhardt soils. (Capability unit IVe-7)

Chaseburg Series

The Chaseburg series consists of well drained to moderately well drained soils in gently sloping upland draws and narrow drainageways. The soils developed in silty materials. Their parent materials washed from soils on nearby uplands and terraces and were transported by water. In many places many of the layers of soil materials originally deposited have not been altered significantly since they were deposited. In small areas, generally less than 1 acre in size, there may be particles of coarse sand or fragments of stone on the surface. In many places there are thin lenses of sand throughout the profile.

The Chaseburg soils are somewhat similar to the Arenzville soils, but they are in higher positions than those soils. They are flooded occasionally, but the floodwaters seldom remain on the soils long enough to damage crops. These soils are well suited to crops, and nearly all of the acreage is used for that purpose.

Chaseburg silt loam, 2 to 6 percent slopes (CaB).—This soil has a surface layer of very dark grayish-brown silt loam. The surface layer is as much as 32 inches thick in places, but it varies greatly in thickness. Minor variations in color occur throughout this layer. In some places the surface layer is laminated.

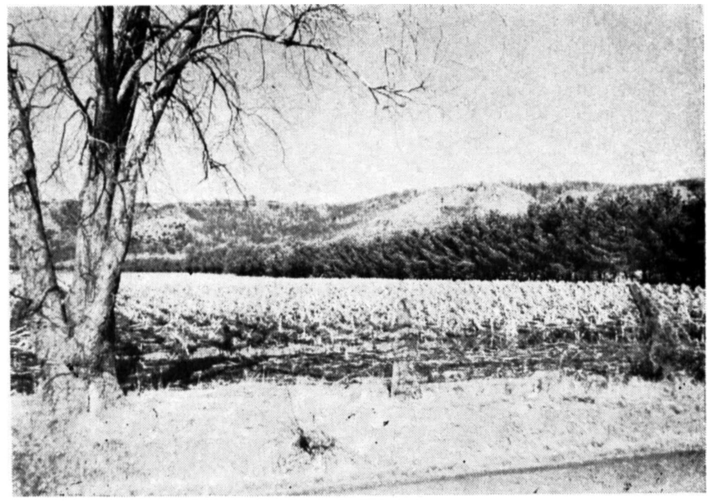

Figure 5.—**Burkhardt and Dakota soils on a nearly level stream terrace. A shelterbelt separates these soils from areas of Steep stony and rocky land in the background.**

Underlying the surface layer is dark-brown or dark yellowish-brown silt loam. This soil material has a more uniform color than that in the surface layer, and it becomes lighter colored with increasing depth. The friable, silty material extends downward for several feet.

This soil is highly productive if it is well managed. In some areas, however, there is a slight hazard of flooding because there are no adequate channels for disposing of runoff. There is also the danger of runoff channels cutting into the soil and forming gullies. (Capability unit IIw-11)

Chaseburg silt loam, 0 to 2 percent slopes (CaA).—This soil is similar to Chaseburg silt loam, 2 to 6 percent slopes. It is more nearly level, however, and is more susceptible to overflow. (Capability unit IIw-11)

Chaseburg silt loam, 6 to 12 percent slopes (CaC).—This soil has stronger slopes than Chaseburg silt loam, 2 to 6 percent slopes, and occurs in narrower drainageways. Also, because of runoff, the hazard of erosion is more severe. The soil needs diversion ditches and grassed waterways to help protect cultivated areas from erosion. (Capability unit IIIe-1)

Curran Series

The Curran series is made up of somewhat poorly drained, deep, silty soils on stream terraces. The soils have developed in a layer of silty alluvium that is more than 42 inches thick. They occur in close association with the Bertrand and Jackson soils, but they are in lower positions and have poorer drainage than those soils. Water drains through the profile slowly. Therefore, the Curran soils are wet unless they are drained. Only one soil of this series, Curran silt loam, is mapped in this county.

Curran silt loam (Cu).—This soil is nearly level and has had little or no erosion. The surface layer is dark-gray to very dark grayish-brown silt loam and is 7 to 10 inches thick. Just below it is brown to grayish-brown silt loam that extends to a depth of about 15 inches. This underlying material is mottled with small, brown splotches and has thin to medium, platy structure. At a depth between 15 and 32 inches is pale-brown silt loam or silty clay loam, highly mottled with dark brown and yellowish brown. The underlying soil material is generally wet. It consists of grayish-brown silt loam that extends to a depth of several feet.

If drainage is improved, moderately high yields of corn, small grains, and hay can be obtained on this soil. Drainage can be improved by providing surface ditches to remove the ponded water. (Capability unit IIw-2)

Dakota Series

The Dakota series is made up of well-drained soils that are on the terraces of streams throughout the county. The soils are nearly level to gently undulating. Their texture is loam or fine sandy loam to a depth of 24 to 36 inches, and below is loose sand. The Dakota soils occur in the same general areas as the Sparta, Burkhardt, and Hubbard soils, but they are less droughty than those soils.

Dakota loam, 0 to 2 percent slopes (DbA).—This soil is nearly level and has little runoff. Consequently, some areas are not eroded and others are only slightly eroded. The surface layer is very dark brown or black, friable loam and is about 10 to 12 inches thick. The subsoil is dark-brown, heavy loam to a depth of about 28 inches, but it is dark-brown fine sandy loam at a depth between 28 and 32 inches. Extending to a depth of many feet are yellowish-brown, loose, layered sands. In a few areas the sands contain a small amount of fine gravel.

This soil is used mainly to grow corn, oats, and a mixture of alfalfa and bromegrass. It is slightly droughty, but yields are high if the soil is managed properly. (Capability unit IIs-1)

Dakota loam, 2 to 6 percent slopes (DbB).—This soil is only slightly eroded. It is similar to Dakota loam, 0 to 2 percent slopes, but it has a greater amount of runoff and retains less moisture. Consequently, yields on this soil may be slightly lower than on Dakota loam, 0 to 2 percent slopes. This soil is used to grow corn, oats, alfalfa and bromegrass, and other general farm crops. (Capability unit IIe-2)

Dakota fine sandy loam, 0 to 2 percent slopes (DaA).—Some areas of this soil are not eroded, and others are only slightly eroded. The surface layer is very dark brown, friable fine sandy loam, 8 to 14 inches thick. It is lighter colored in the lower than in the upper part. The subsoil, a dark-brown fine sandy loam or loam, extends to a depth of 24 to 36 inches. Below is loose sand that extends to a depth of several feet. In places the sand contains a few small pebbles.

This soil is used to grow general farm crops. The principal crops are corn, oats, and alfalfa and bromegrass grown together, but soybeans and red clover are also grown. Yields are moderately good if there is a good supply of moisture during the growing season. (Capability unit IIIs-2)

Dakota fine sandy loam, 2 to 6 percent slopes (DaB).—This soil has stronger slopes than Dakota fine sandy loam, 0 to 2 percent slopes, but the two soils are similar. All of the soil is cropped. The crops are of the same kinds as those grown on Dakota fine sandy loam, 0 to 2 percent slopes. Yields are often slightly lower on this soil, however, because there is a greater amount of runoff and less moisture is retained. (Capability unit IIIs-2)

Dakota fine sandy loam, 2 to 6 percent slopes, moderately eroded (DaB2).—This soil has a thinner and slightly lighter colored surface layer than the other Dakota fine sandy loams. From one-third to two-thirds of the original surface layer has been lost as the result of erosion by wind or water, and the present surface layer is only about 4 to 6 inches thick. Plowing has mixed soil materials from the upper part of the subsoil with the remaining surface soil. As a result, the present surface layer is dark brown rather than the original very dark brown. This soil has a slightly greater amount of runoff than the other Dakota soils, and it erodes more easily.

All of this soil is cropped. Yields are often slightly lower, however, than yields on the other Dakota soils. (Capability unit IIIs-2)

Downs Series

The Downs series consists of deep, well-drained soils developed in a thick mantle of windblown silt, or loess. Some of these soils occur on broad ridges in association with Fayette soils. Others are on benches—low ridges or hills—which are believed to be the remains of old stream terraces dissected by erosion. In this county the Downs soils on benches are in positions about halfway between those of the upland soils on ridges and those of the soils on the terraces of streams.

The Downs soils on ridges are on the broader, less rolling parts of the ridges throughout the county. The largest acreage is on Alma Ridge. Nearly all of the acreage on benches is in the northern part of the county in the broad valley of Bear Creek.

Downs silt loam, 2 to 6 percent slopes (DcB).—This soil is only slightly eroded. Of the soils on ridges, it is among the most desirable in the county for agriculture. The soil occurs on the central and highest part of Alma Ridge. Water from adjacent areas does not flow onto it, and the surface layer absorbs moisture readily. There is only a small amount of runoff.

The surface layer is very dark grayish-brown or very dark brown, friable silt loam that is about 8 to 12 inches thick. It is underlain by brown silt loam that extends to a depth of about 14 inches. The subsoil of dark-brown, light silty clay loam extends to a depth of about 36 inches. It grades to dark yellowish-brown, smooth silt loam.

The thickness of the mantle of loess in which the soil developed ranges from 3½ to 10 feet. The loess overlies limestone. As the result of weathering and leaching, the soil is acid, but the underlying silty material is less acid at greater depths.

This soil occurs in fairly large areas. Its gentle slopes and good response to management make it highly desirable for crops, and high yields are obtained. The principal crops are corn, oats, and alfalfa and bromegrass grown for hay. (Capability unit IIe-1)

Downs silt loam, 2 to 6 percent slopes, moderately eroded (DcB2).—This soil has a thinner surface layer than Downs silt loam, 2 to 6 percent slopes. From one-third to two-thirds of the original surface layer has been lost through erosion, and the present surface layer is only about 4 to 8 inches thick.

Like Downs silt loam, 2 to 6 percent slopes, this soil is highly desirable for crops. Yields are often slightly lower than on the less eroded soil, however, because of the thinner surface layer and slightly greater runoff. (Capability unit IIe-1)

Downs silt loam, 6 to 12 percent slopes, moderately eroded (DcC2).—This soil is similar to Downs silt loam, 2 to 6 percent slopes, but it has stronger slopes. The surface layer is also thinner, or about 4 to 8 inches thick. A greater amount of water runs off this soil, and there is a greater hazard of erosion than on the other Downs silt loams. The soil is used to grow general farm crops, mainly corn, small grains, and alfalfa and bromegrass. High yields are obtained. (Capability unit IIIe-1)

Downs silt loam, benches, 2 to 6 percent slopes (DdB).—This soil occurs in fairly large areas. It is on the gently sloping tops of high benches along streams. As the result of its gentle slopes, its position on the landscape, and the large amount of organic matter in the surface layer, the soil absorbs much of the water from rainfall and there is only a moderate amount of runoff. Less than one-third of the surface layer has been lost through erosion.

The surface layer is very dark brown silt loam that is 8 to 12 inches thick. The subsoil is dark-brown, heavy silt loam to silty clay loam. It extends to a depth of about 36 inches and is underlain by yellowish-brown, smooth silt loam. The underlying silty material is deep. It extends to a depth of as much as 15 feet in many places. The silt overlies thinly bedded, partly weathered, greenish sandstone that is fine grained and shaly. In places there are thin layers of calcareous silt in the lower part of the profile.

This soil is highly productive. It is easy to work and responds well to good management. All of the acreage is used for crops, mainly corn, oats, and a mixture of alfalfa and bromegrass. (Capability unit IIe-1)

Downs silt loam, benches, 6 to 12 percent slopes, moderately eroded (DdC2).—This soil is on the tops of rolling, high stream benches or is on the side slopes of the benches. There is a greater amount of runoff than on Downs silt loam, benches, 2 to 6 percent slopes, and more of the soil has been lost through erosion. The present surface layer is 4 to 8 inches thick. The soil is highly susceptible to further erosion.

This soil is used for crops. If it is managed properly, good yields of corn, oats, and mixed alfalfa and bromegrass are obtained. (Capability unit IIIe-1)

Downs silt loam, benches, 12 to 20 percent slopes, moderately eroded (DdD2).—This soil occurs in long, narrow bands on the strongly sloping sides of high benches along streams. It is in a lower position than the other Downs soils on benches, and it receives runoff from those soils. Because of its strong slopes, the soil is highly susceptible to further erosion. It is similar to Downs silt loam, benches, 2 to 6 percent slopes, but the solum is thinner and the present surface layer is only about 4 to 8 inches thick. The subsoil extends to a depth of about 32 inches.

Most of this soil is used for crops. The principal crop is alfalfa and bromegrass grown together, but corn and oats are also grown extensively. Some areas have been renovated and are kept in alfalfa and bromegrass, which are used for hay or pasture. (Capability unit IVe-1)

Dubuque Series

The Dubuque soils are silty and well drained. They have formed in loess and in reddish, residual clay that weathered from dolomitic limestone. The soils of this series differ in depth to limestone or clayey materials. The normal Dubuque silt loams range from 20 to 30 inches in thickness. In contrast, the Dubuque silt loams, deep, range from 30 to 42 inches in thickness.

The Dubuque soils are on rolling ridges throughout the county and are associated with Fayette soils. They are extensive and are of great importance to agriculture.

Dubuque silt loam, 6 to 12 percent slopes, moderately eroded (DeC2).—This soil occurs on rounded limestone ridges that are capped with a 12- to 20-inch layer of loess. From one-third to two-thirds of the original surface layer has been lost through erosion. The present surface layer is dark grayish-brown, friable silt loam that is 4 to 8 inches thick. The subsoil, a yellowish-brown, heavy silt loam, extends to a depth of about 18 inches. Below that depth is reddish-brown, plastic clay that ranges from a few inches to several feet in thickness over the limestone. Commonly, fragments of chert are scattered over the surface of this soil and are in the layer of reddish-brown clay.

This soil is likely to be damaged severely if it is further eroded. Continued erosion will expose the clay, which is less productive than the silt loam and is more difficult to till.

The soil is used for crops, mainly corn, oats, and alfalfa and bromegrass grown together for hay. Yields are moderate if good management is used. (Capability unit IIIe-2)

Dubuque silt loam, 2 to 6 percent slopes (DeB).—This soil is similar to Dubuque silt loam, 6 to 12 percent slopes, moderately eroded, but it has milder slopes and a slightly thicker surface layer. It is near the ends of broad ridgetops or occurs on narrow, fingerlike ridges. Because of the size and shape of the areas, the soil has not been cleared. A mat of partly decomposed forest litter protects it from runoff and erosion. Hardwoods make good yields on this soil. (Capability unit IIe-2)

Dubuque silt loam, 2 to 6 percent slopes, moderately eroded (DeB2).—This soil is on narrow ridgetops where there is a moderate amount of runoff. Clay is at a shallow depth in the profile. Protecting the soil from further erosion, therefore, is important. This soil is used mainly to grow corn and oats or to grow alfalfa and bromegrass together for hay. Yields are moderately high under good management. (Capability unit IIe-2)

Dubuque silt loam, 6 to 12 percent slopes (DeC).—This soil is similar to Dubuque silt loam, 6 to 12 percent slopes, moderately eroded, but it has a slightly thicker surface layer. It is on narrow ridges or on the tops of ridges that are too narrow or of too odd a shape to be cultivated. The soil has never been cleared and is covered by a mat of forest litter. Little water runs off. As a result, erosion has been very slight. If this soil is protected from fire and grazing, good yields of hardwoods are obtained. (Capability unit IIIe-2)

Dubuque silt loam, 12 to 20 percent slopes (DeD).—This soil has a slightly thicker surface layer than Dubuque silt loam, 6 to 12 percent slopes, moderately eroded. It is in narrow strips along the edges of ridges, at the point where there is a break between the rounded ridgetops and the more strongly sloping sides of the bluffs.

Little of this soil has been cleared, but small areas are used for pasture. The soil receives runoff from the soils that lie higher on the ridges. Therefore, careful management is required if crops are grown. The soil supports good stands of hardwoods. If it is protected from fire and grazing, it is productive as woodland. (Capability unit IVe-2)

Dubuque silt loam, 12 to 20 percent slopes, moderately eroded (DeD2).—This soil is in narrow bands along the edges of ridges. It occurs at the point where there is a break between the rounded ridgetops and the more strongly sloping sides of the bluffs. Reddish clay is at a shallow depth in this soil. Further erosion will expose the clay and will make the soil less productive and more difficult to work.

This soil is used for pasture and crops. Because of the risk of severe erosion, it is not suited to intensive cultivation. Usually, after 1 year of corn or a small grain, alfalfa and bromegrass are grown for hay over a period of 3 or 4 years. (Capability unit IVe-2)

Dubuque silt loam, 20 to 30 percent slopes (DeE).—This soil has a slightly thicker surface layer than Dubuque silt loam, 6 to 12 percent slopes, moderately eroded. It is on the steep slopes of ridges. Except for small, open areas that are pastured, the soil is covered by hardwoods and has a thin mat of forest litter on the surface. Erosion has been very slight.

The soil is too steep for cultivated crops, but good yields of timber are obtained. Yields of pasture are moderate if the soil is managed properly. (Capability unit VIe-1)

Dubuque silt loam, 20 to 30 percent slopes, moderately eroded (DeE2).—This soil is similar to Dubuque silt loam, 6 to 12 percent slopes, moderately eroded, except that it has stronger slopes. It has lost from one-third to two-thirds of the original surface layer through erosion. Because of its strong slopes, further erosion would be severe if the soil were used for cultivated crops. If the silty materials were removed and the clay were exposed, the soil would be considerably less productive than it is now.

Most of this soil is in pasture or is reverting to forest. It is well suited to hardwoods. Moderate yields of hay and pasture can be obtained if the areas are renovated and are well managed. (Capability unit VIe-1)

Dubuque silt loam, 30 to 40 percent slopes, eroded (DeF2).—This soil is on the steep sides of ridges. It is more variable in depth over clay than Dubuque silt loam, 20 to 30 percent slopes, moderately eroded, but in most places it is shallower. In many of the areas, clay is at a depth of only 12 inches.

Except for a few open areas that are in grass pasture, this soil is in hardwoods. On the north- and east-facing slopes, there are good stands of trees, but on the south- and west-facing slopes, which are warmer and have a less favorable supply of moisture, the trees grow more slowly and the stand is thinner. The slopes are generally too steep for pastures to be renovated, and yields of forage are low.

This soil is probably best kept in timber or used as wildlife habitats. To obtain the best yields of timber, protect the trees from fire and grazing and use other good timber management. (Capability unit VIIe-1)

Dubuque soils, 6 to 12 percent slopes, severely eroded (DsC3).—This mapping unit consists of soils that have lost at least two-thirds of the original surface layer through erosion. The present surface layer ranges in color from dark brown to reddish brown. In texture it ranges from silt loam to clay, depending upon how much, if any, of the silty material remains over the clay. Clay, chert, and fragments of limestone are so near the surface they have been turned up by plowing.

These soils are low in productivity and are hard to cultivate. Some of the areas are used for cultivated crops, but most of the acreage is used to grow alfalfa and bromegrass for pasture or hay. Careful management must be used; otherwise, the clay erodes rapidly. (Capability unit IVe-2)

Dubuque soils, 12 to 20 percent slopes, severely eroded (DsD3).—The soils in this mapping unit are similar to Dubuque soils, 6 to 12 percent slopes, severely eroded, but they have stronger slopes. They are better suited to hay crops and pasture than to cultivated crops. (Capability unit VIe-1)

Dubuque soils, 20 to 30 percent slopes, severely eroded (DsE3).—Because of strong slopes and severe erosion, these soils are hard to cultivate. They need to be kept in sod to prevent them from being damaged further by erosion. If they are managed properly, fair yields of hay crops and pasture are obtained. (Capability unit VIIe-1)

Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded (DpC2).—This soil is on rounded limestone ridges that are covered with 20 to 42 inches of loess. The surface layer is dark grayish-brown, friable silt loam that is 4 to 8 inches thick. The subsoil extends to a depth of 20 to 42 inches. The upper part of the subsoil is dark-brown silty clay loam, and the lower part is reddish-brown, plastic clay. The clay ranges from a few inches to several feet in thickness. In most places it contains numerous hard fragments of chert.

This soil has moderately rapid runoff and is likely to be damaged by erosion if it is not well managed. It is used for crops, mainly corn, oats, and alfalfa and bromegrass grown for hay. If the soil is well managed, good yields are obtained. (Capability unit IIIe-1)

Dubuque silt loam, deep, 2 to 6 percent slopes (DpB).—This soil has milder slopes than Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded, and it has been damaged less by erosion. The soil occurs in small areas on narrow, fingerlike ridges or on the tops of other ridges. Because of the shape, size, or location of the areas, the soil is not used for crops, and most of the acreage is in woods. High yields of wood products are obtained if the soil is managed properly. (Capability unit IIe-1)

Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded (DpB2).—This soil has milder slopes and less runoff than Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded. It responds well to good management and is used for crops. The principal crops are corn, oats, and alfalfa and bromegrass grown together for hay. (Capability unit IIe-1)

Dubuque silt loam, deep, 6 to 12 percent slopes (DpC).—This soil is similar to Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded, but it is less eroded. The areas are mainly on the narrow tops or points of ridges. Because of their shape, size, or location, many areas are not well suited to cultivation, and most of them are covered by hardwoods.

This soil is covered by a mat of forest litter that is partly decomposed. The layer is spongy. It absorbs the water from rainfall and protects the soil from erosion. If good management is used, high yields of wood products are obtained from woodlots located on this soil. (Capability unit IIIe–1)

Dubuque silt loam, deep, 12 to 20 percent slopes (DpD).—This soil is less eroded than Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded. It occurs in fairly narrow areas along the edges of limestone ridges. The areas are at the point where there is a break between the less sloping, rounded ridgetops and the steep sides of the bluffs. Most of the soil is covered by hardwoods, but a few small areas are pastured. The soil responds well to management practices that are suitable for hay, pasture, and woodland. It is suited to only limited use for cultivated crops. (Capability unit IVe–1)

Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded (DpD2).—This soil is similar to Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded, but it has stronger slopes. It is highly susceptible to further damage by erosion. Corn, oats, and alfalfa and bromegrass grown together for hay are the principal crops. Hay crops are usually grown a much larger proportion of the time than cultivated crops. (Capability unit IVe–1)

Dubuque silt loam, deep, 20 to 30 percent slopes (DpE).—This soil is unsuited to cultivated crops because it occurs on the strong slopes of limestone ridges. It is less eroded than Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded. More than half of the acreage is in hardwoods, and the rest is pastured. On areas that have been renovated, high yields of hay and pasture are obtained. Yields of wood products are high on this soil if proper management is used. (Capability unit VIe–1)

Dubuque silt loam, deep, 20 to 30 percent slopes, moderately and severely eroded (DpE2).—This soil is similar to Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded, except that it has stronger slopes. It is on the steep sides of limestone ridges. Because of its strong slopes and the large amount of runoff, it is suited only to hay crops, pasture, and trees. Most of the acreage is in bluegrass, or improved, pasture. High yields of hay and pasture are obtained if the areas are renovated. (Capability unit VIe–1)

Dubuque soils, deep, 6 to 12 percent slopes, severely eroded (DuC3).—These soils are similar to Dubuque silt loam, deep, 6 to 12 percent slopes, but they have lost more than two-thirds of the original surface layer through erosion. The present plow layer is yellowish brown and consists of material from the former subsoil. The soils are low in organic matter. In general, they have poor tilth because the former subsoil is less easily worked than the original surface layer.

These soils are highly susceptible to further damage by erosion. They are used for crops, but yields of corn and small grains are usually low unless large amounts of barnyard manure or commercial fertilizer are applied. Alfalfa and bromegrass grown together, as well as other legumes and grasses, make high yields on these soils if they are limed and fertilized properly. (Capability unit IVe–1)

Dubuque soils, deep, 12 to 20 percent slopes, severely eroded (DuD3).—These soils have a thinner surface layer than Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded. The present surface layer is less than 4 inches thick. Its color is yellowish brown because part of the subsoil has been mixed with the surface layer by plowing. The present surface layer is low in organic matter and generally has poor tilth.

Most of the acreage is in hay crops or pasture, and little of it is used to grow corn or other row crops. The principal forage crops are alfalfa and bromegrass grown together. Good yields are obtained if the soils are well managed. (Capability unit VIe–1)

Duelm Series

The Duelm soils are moderately well drained to somewhat poorly drained. They are underlain by layered wet sands at a depth below 24 to 36 inches. The normal Duelm fine sandy loam is better drained than Duelm fine sandy loam, high water table, which has water at or near the surface throughout the entire year.

In this county the Duelm soils are on the terrace between Buffalo City and Cochrane. They occur in low areas along a stream that traverses the terrace and flows southward from the vicinity of Cochrane. Underground seepage from the Mississippi River is believed to be the main source of water for the stream and causes the water table to be high in these soils. Consequently, the amount of moisture in the subsoil fluctuates as the level of the water rises or falls in the Mississippi River. The soils show little or no response to drainage.

Duelm fine sandy loam (Dv).—This soil has a surface layer of very dark brown, friable fine sandy loam that is 10 to 15 inches thick. The upper part of the subsoil is dark-brown, heavy fine sandy loam that extends to a depth of about 26 inches. In places it has mottles of dark red and yellowish brown. The lower part of the subsoil, below a depth of about 26 inches, has a texture of loamy fine sand and is mottled with yellowish brown. The substratum consists of loose, medium to fine sand and is at a depth of about 36 inches.

Mapped with this soil are a few areas in which the texture of the surface layer is loam. These areas were too small to delineate separately.

Nearly all of Duelm fine sandy loam is used for crops. Because of the seasonal changes in internal drainage, management practices are somewhat different from those used on many of the soils in the county. The principal crop is soybeans, which can be planted after the excess moisture has left the soil in spring. Even though this crop is planted late, it will mature before the first killing frost in fall. (Capability unit IIIw–5)

Duelm fine sandy loam, high water table (Dw).—The surface layer of this soil is black fine sandy loam that is 8 to 15 inches thick. It contains a large amount of decayed plant remains that give a mucky feel to the soil. The upper part of the subsoil is dark grayish-brown, slightly sticky sandy clay loam to fine sandy loam and extends to a depth of 26 inches. It is highly mottled with splotches of dark brown. The lower part of the subsoil, below a depth of 26 inches, is grayer and grades from slightly compact sandy loam to gray, loose sand. The sand is at a depth of 29 inches.

Little can be done to improve the drainage of this soil, because the Mississippi River influences its water table. Most of the soil is used for pasture. The vegetation consists mainly of bluegrass and of sedges, willows, and other plants that tolerate water. (Capability unit Vw-15)

Ettrick Series

The Ettrick series consists of nearly level, poorly drained soils that are on bottom lands throughout the county. They have formed in silty sediments deposited by streams. The soils are flooded frequently. Unless artificial drainage is provided, they are perennially wet. The water table is at a depth of 12 to 24 inches.

The Ettrick soils occur in the same general areas as other poorly drained or somewhat poorly drained soils of bottom lands, such as Wallkill silt loam, Peat and Muck, and areas of Alluvial lands.

Ettrick silt loam (Es).—This soil has a surface layer of black, friable silt loam that is 10 to 15 inches thick. The subsoil, a gray silty clay loam, extends to a depth of 36 to 48 inches. Below it is wet, gray silt. The soil has yellowish-brown and reddish mottles throughout the profile. Some areas have a 2- to 3-inch layer of muck on the surface. Others are covered by several inches of light-colored, silty overflow sediments.

Crops are grown on areas that have been drained. Corn is grown more of the time than other crops, but oats, red clover, ladino clover, and alfalfa-bromegrass hay are also grown. Areas that have not been drained are too wet for crops and usually remain in pasture. (Capability unit IIw-1)

Ettrick silt loam, sandy substratum (Et).—This soil is similar to Ettrick silt loam. It has a thinner subsoil, however, and layers of fine sand and coarse silt are at a depth of 24 to 30 inches. The soil is used for crops and pasture, but yields are low if supplemental drainage has not been provided. (Capability unit IIIw-5)

Fayette Series

The Fayette series consists of deep, well-drained soils on upland ridges and on valley slopes. The soils formed in deep, windblown silt, or loess. Those on valley slopes have less clay in the subsoil than the ones on uplands. In places the Fayette soils have a small amount of sand in the surface layer and fragments of limestone or sandstone throughout the profile.

The Fayette soils on uplands have a wide range of slope, but the slopes are mainly between 3 and 20 percent. These soils occur in association with the Dubuque, Downs, and Gale soils.

Fayette silt loams, valleys, have slopes ranging from 4 to 35 percent, but the slopes are mainly between 12 and 30 percent. These soils occur in the same general areas as the Norden and Lindstrom soils.

The Fayette soils are the most extensive of the soils in Buffalo County. They respond well to management and are important to the agriculture of the county. Most of the acreage is used for crops, mainly for corn, oats, and alfalfa and bromegrass grown for hay. The steeper areas are used for pasture or as woodlots.

Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded (FaC2).—This soil is on rounded, sloping ridgetops where there is a moderately large amount of runoff. It has lost from one-third to two-thirds of the original surface layer through erosion. The present surface layer is dark grayish-brown to very dark grayish-brown, friable silt loam that is 4 to 8 inches thick. The subsoil, a dark yellowish-brown silty clay loam, extends to a depth of about 36 inches. The underlying parent material is yellowish-brown, smooth silt loam that is generally several feet thick over limestone or sandstone.

This soil has good moisture-storing capacity and is highly productive if it is well managed. It is used mainly for crops. (Capability unit IIIe-1)

Fayette silt loam, uplands, 2 to 6 percent slopes (FaB).—This soil is on the broader, silt-capped ridges. It is similar to Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded, but it has milder slopes, and little or none of its surface layer has been lost through erosion. This soil is highly desirable for crops. Some areas not reached easily with farm machinery have remained as woodland or are pastured. (Capability unit IIe-1)

Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded (FaB2).—This soil is on the broader, less rolling ridgetops throughout the county. It has less runoff than Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded, and there is only a moderate hazard of erosion. Most of the soil is used for crops. Yields are high if management is good. (Capability unit IIe-1)

Fayette silt loam, uplands, 6 to 12 percent slopes (FaC).—This soil is similar to Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded, except that it is less eroded. Many of the areas are in trees or pasture. (Capability unit IIIe-1)

Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded (FaC3).—This soil has lost more than two-thirds of the original surface layer through erosion.. Tillage has mixed part of the subsoil with the remaining surface layer. As a result, the present surface layer is yellowish brown. The soil is low in organic matter and is difficult to maintain in good tilth. If it is used for row crops, yields are moderately low. Hay crops and pasture yield well if management is good. (Capability unit IVe-1)

Fayette silt loam, uplands, 12 to 20 percent slopes (FaD).—This soil is similar to Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded, but it has a thicker surface layer. It is only slightly eroded because much of it has been kept under timber or has been used for pasture. Nevertheless, because of its strong slopes, it has severe limitations if used for crops. If this soil is cropped, intensive practices are needed to prevent erosion. High yields can be obtained if fertility is kept at a high level and other good management is used. (Capability unit IVe-1)

Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded (FaD2).—This soil has stronger slopes than Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded. It is highly susceptible to erosion if it is used for row crops. It is best to keep this soil in hay or other close-growing crops most of the time. (Capability unit IVe-1)

Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded (FaD3).—This soil is similar to Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded, but it has lost most of its original surface layer through erosion. The present plow layer consists mainly of material from the former subsoil. It is yellowish brown and is compacted as the result of tillage. The soil is low in organic matter. It erodes rapidly if it is not properly managed. Most of the acreage is pastured or is used to grow hay. (Capability unit VIe-1)

Fayette silt loam, uplands, 20 to 30 percent slopes (FaE).—Although this soil has stronger slopes than Fayette silt loam uplands, 6 to 12 percent slopes, moderately eroded, it is less eroded. A few slightly steeper areas of Fayette soils, too small to delineate separately, are mapped with it. (Capability unit VIe-1)

Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded (FaE2).—This soil has much stronger slopes than Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded. Mapped with it are a few areas of slightly steeper Fayette soils that were too small to delineate separately. The soil is used mainly for pasture. (Capability unit VIe-1)

Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded (FaE3).—In a few places this soil has slopes of as much as 35 percent. It has lost more than two-thirds of the original surface layer through erosion. Tillage has exposed part of the former subsoil and has mixed part of the subsoil with the remaining surface layer. As a result, the present surface layer is yellowish-brown, compacted, heavy silt loam. This soil is low in organic matter. It is highly susceptible to further erosion. (Capability unit VIIe-1)

Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded (FvE2).—This soil has strong slopes and occurs below areas of Steep stony and rocky land. Its surface layer is dark grayish-brown to very dark grayish-brown silt loam that is 4 to 8 inches thick. The subsoil is dark yellowish-brown, slightly compact silt loam or light silty clay loam. At a depth of about 36 inches, it grades to yellowish-brown, friable, deep, silty material.

The surface layer, in many places, contains fine sand in an amount that makes it feel gritty when rubbed between the fingers. Along the upper edges of the slopes, next to areas of Steep stony and rocky land, the surface layer is covered, in many places, by a thin layer of fine sand. In many places fragments of limestone and sandstone are scattered throughout the profile.

Mapped with this soil are a few areas of Fayette soils that have slopes of as much as 35 percent. These areas are too small to delineate separately on the soil map.

Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded, is highly susceptible to further erosion because it receives runoff from the tops of the ridges and from the steep slopes above it. It is used primarily for renovated pasture. (Capability unit VIe-1)

Fayette silt loam, valleys, 2 to 6 percent slopes (FvB).—This soil is somewhat similar to Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded. It contains less gritty material, however, its surface layer is 8 to 10 inches thick, and it has a thicker subsoil. The soil is used for crops. High yields are obtained if management is good. (Capability unit IIe-1)

Fayette silt loam, valleys, 6 to 12 percent slopes (FvC).—This soil is not eroded or is only slightly eroded. Most of the areas have remained in timber that consists mainly of hardwoods. The soil is not extensive, and most of the areas are small. (Capability unit IIIe-1)

Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded (FvC2).—This soil has a slightly thicker subsoil than Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded. The slopes are mild enough to allow the growing of corn and other row crops if practices are used to control erosion. The runoff received from the uplands soils is advantageous in dry years, but it adds to the hazard of erosion. The soil is highly productive if it is protected from erosion, fertilized, and otherwise well managed. (Capability unit IIIe-1)

Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded (FvC3).—This soil has lost more than two-thirds of its original surface layer through erosion. Plowing has mixed part of the subsoil with the remaining surface layer. As a result, the present surface layer has a lighter color and a finer texture than the original one.

This soil is low in organic matter and is difficult to keep in good tilth. If row crops are grown, practices are needed to control erosion. Hay crops and pasture yield well if good management practices are used. (Capability unit IVe-1)

Fayette silt loam, valleys, 12 to 20 percent slopes (FvD).—This soil is only slightly eroded. The surface layer is 8 to 10 inches thick and has retained most of its original supply of organic matter. The soil is in valley heads or occurs in narrow strips below areas of steeper soils. Most of the acreage is in timber or pasture. (Capability unit IVe-1)

Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded (FvD2).—This soil is similar to Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded, but its slopes are less steep. Like other Fayette silt loams, valleys, it receives runoff from the adjacent uplands and is subject to severe erosion. Most of the acreage is used to grow forage crops, such as alfalfa and bromegrass. A few areas are used to grow general farm crops. (Capability unit IVe-1)

Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded (FvD3).—This soil has lost more than two-thirds of the original surface layer through erosion. Plowing has mixed part of the yellowish-brown subsoil with the remaining surface layer. As a result, the present surface layer is lighter colored than that of the Fayette silt loams, valleys, that are only slightly or moderately eroded.

This soil is low in organic matter and is difficult to keep in good tilth. If it is not protected by hay crops, pasture, or other close-growing vegetation, this soil erodes rapidly. (Capability unit VIe-1)

Fayette silt loam, valleys, 20 to 30 percent slopes (FvE).—This soil is similar to Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded, but it has had little or no damage as the result of erosion. In a few places it has slopes of as much as 35 percent. Like the other strongly sloping Fayette soils on valley slopes, this soil is mainly in pasture or trees. (Capability unit VIe-1)

Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded (FvE3).—In a few places this soil has slopes of as much as 35 percent. Less than 4 inches of its original friable surface soil remains. This soil is low in organic matter. It has been severely eroded and will continue to erode rapidly if it is not protected by sod or by a cover crop. (Capability unit VIIe–1)

Gale Series

In the Gale series are well-drained, silty soils, underlain by sand or by weathered sandstone at a depth of 24 to 42 inches. Slopes generally range from 12 to 20 percent, but in some places they are milder or stronger. The Gale soils are somewhat similar to the Hixton soils, but they formed in silty loess, and the Hixton soils, in materials weathered from sandstone. The Gale soils are moderate in moisture-storing capacity. Like other soils of the rolling uplands, they are likely to be damaged by erosion.

The Gale soils are mainly on ridges in the northeastern part of the county, but they are also on ridges in other parts of the county, below uplands capped by limestone. In areas where the relief is favorable, Gale soils are suited to the crops commonly grown in the area. They are used mainly to grow corn, oats, and mixtures of alfalfa and bromegrass. Areas that have stronger slopes are kept in pasture or woods.

Gale silt loam, 12 to 20 percent slopes, moderately eroded (GaD2).—This soil has lost from one-third to two-thirds of the original surface layer through erosion. The present surface layer is dark grayish-brown, friable silt loam that is about 4 to 8 inches thick. The subsoil, a dark yellowish-brown, compact silty clay loam, extends to a depth of 28 to 31 inches. It overlies yellowish-brown, loose sand that extends to a depth of several feet. The sand overlies sandstone and contains fragments of sandstone. (Capability unit IVe–2)

Gale silt loam, 2 to 6 percent slopes, moderately eroded (GaB2).—This soil is similar to Gale silt loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes. It also has less runoff and is less likely to be damaged through erosion. In a few small areas, the surface layer is slightly thicker and darker than typical. (Capability unit IIe–2)

Gale silt loam, 6 to 12 percent slopes, moderately eroded (GaC2).—This soil is similar to Gale silt loam, 12 to 20 percent slopes, moderately eroded, except that it has milder slopes. In a few small areas, the soil is only slightly eroded. Also, in a few areas the surface layer is darker than that of the typical soil. (Capability unit IIIe–2)

Gale silt loam, 6 to 12 percent slopes, severely eroded (GaC3).—This soil has lost more than two-thirds of the original surface layer through erosion. Tillage has mixed part of the subsoil with the remaining surface soil. As a result, the present plow layer is yellowish brown, compact, and more difficult to keep in good tilth than the original one.

This soil is low in organic matter and is highly susceptible to further erosion. Because of severe erosion, it has a thinner profile than the slightly eroded and moderately eroded Gale soils, and it is slightly lower in moisture-storing capacity. (Capability unit IVe–2)

Gale silt loam, 12 to 20 percent slopes (GaD).—This soil is similar to Gale silt loam, 12 to 20 percent slopes, moderately eroded, but it has a thicker surface layer. It occurs in small areas and is used for crops or timber. (Capability unit IVe–2)

Gale silt loam, 12 to 20 percent slopes, severely eroded (GaD3).—This soil differs from Gale silt loam, 12 to 20 percent slopes, moderately eroded, in having lost nearly all of its original surface layer through erosion. It is also slightly shallower over the underlying sands. This soil is highly susceptible to erosion. Most of the areas are in pasture. (Capability unit VIe–1)

Gale silt loam, 20 to 30 percent slopes (GaE).—This soil has strong slopes that, in a few places, are as much as 35 percent. Nevertheless, it is only slightly eroded. The soil is slightly shallower over the underlying sandstone than the less sloping Gale soils. All of it is used for pasture or timber. (Capability unit VIe–1)

Gale silt loam, 20 to 30 percent slopes, moderately eroded (GaE2).—This soil is similar to Gale silt loam, 12 to 20 percent slopes, moderately eroded, but its surface layer and subsoil are slightly thinner and it has stronger slopes. In a few places the slopes are as much as 35 percent. Most of this soil is in pasture. (Capability unit VIe–1)

Gale silt loam, 20 to 30 percent slopes, severely eroded (GaE3).—This soil is the shallowest of the Gale soils. It has lost more than two-thirds of the original surface layer through erosion, and, as a result, sandstone is at a depth of only 24 to 27 inches. The soil contains little organic matter and is lower in moisture-storing capacity than the other Gale soils. In a few places it is severely eroded and has slopes of as much as 35 percent.

Gale silt loam, 20 to 30 percent slopes, severely eroded, is mostly in pasture or is reverting to woodland. The pastured areas need management that will protect them from further erosion. (Capability unit VIIe–1)

Gotham Series

The Gotham series is made up of nearly level to gently undulating, sandy soils that are somewhat excessively drained. The soils are on stream terraces near uplands underlain by sandstone. The sand in which they formed has been transported only relatively short distances from the parent sandstone from which it weathered. It has a texture that is uniformly fine. The sand commonly contains thin layers of finer textured materials, which are at a depth of 3 to 6 feet.

The Gotham soils occur with Sparta and Plainfield soils. They are lighter colored than the Sparta soils and darker colored than the Plainfield. They also have a slightly heavier textured, more compact subsoil than the Sparta and Plainfield soils.

The Gotham soils are somewhat droughty, but nearly all of their acreage is used to grow general crops. The principal crop is soybeans.

Gotham loamy fine sand, 2 to 6 percent slopes (GoB).—This soil is only slightly eroded. Its surface layer is very dark grayish-brown to dark-brown loamy fine sand, 8 to 12 inches thick. The typical subsoil is a dark yellowish-brown, slightly compact loamy fine sand, but in places the subsoil is somewhat firm instead of slightly compact. The subsoil extends to a depth of 24 to 32 inches and is underlain by yellowish-brown, loose sand that is lighter colored with increasing depth. (Capability unit IVs–3)

Gotham loamy fine sand, 2 to 6 percent slopes, eroded (GoB2).—This soil has lost from one-third to two-thirds of its original surface layer through erosion. It is more eroded and has a thinner surface layer than Gotham loamy fine sand, 2 to 6 percent slopes, but the two soils are similar. This soil is slightly more droughty than the uneroded Gotham soils. (Capability unit IVs-3).

Gotham loamy fine sand, 0 to 2 percent slopes (GoA).—This soil is similar to Gotham loamy fine sand, 2 to 6 percent slopes, except that it is more nearly level. It is also slightly less droughty and is less susceptible to erosion by wind and water. (Capability unit IVs-3)

Granby Series

The Granby series consists of somewhat poorly drained to poorly drained, sandy soils that are nearly level to gently undulating. The soils are on the terraces of streams. At a depth below 24 inches, they are underlain by layers of silt, clay, or sandy clay. These layers restrict the downward movement of water through the profile.

The Granby soils occur in the same general areas as the Meridian soils, but they are not so well drained as the Meridian soils. In Buffalo County they are mainly on low terraces in the valley of Bear Creek west of Mondovi and on the high stream benches along county highway K west of Urne.

Granby sandy loam (Gr).—This soil occurs on flats and in depressions in association with the Meridian soils. Its surface layer is very dark grayish-brown sandy loam that is mottled with dark brown and reddish brown at a depth of about 9 inches. The subsoil, at a depth between 12 and 25 inches, is gray loam and is mottled throughout with dark brown. Gray, wet sand is at a depth below 25 inches. In many places the sand contains layers of silty materials. In a few places sandstone is at a depth below 36 inches.

Because of the high water table, which fluctuates with seasonal changes in moisture, this soil is poorly drained. It also receives water that runs off the adjacent uplands. Free water is generally at a depth of 36 to 48 inches.

This soil is used for crops. If it is properly drained, good yields of corn, small grains, and hay are obtained. (Capability unit IIIw-5)

Granby fine sandy loam, stratified substratum variant (Gs).—The surface layer of this soil is very dark grayish-brown, friable fine sandy loam that is about 8 to 10 inches thick. It overlies a layer of yellowish-brown fine sandy loam. The subsoil, a grayish-brown sandy clay to silty clay loam, is at a depth between 24 and 32 inches. It is underlain by stratified sands, silts, and clays. The layers of stratified materials range from 1 to 12 inches in thickness and extend to a depth of several feet. The lower part of the surface layer and the profile below it are mottled with specks of yellowish brown and grayish brown, and mottling is more intense with increasing depth. At a depth below 24 inches, the grayish-brown mottles are predominant.

Because this soil is nearly level, surface runoff is slow The downward movement of water through the soil is also slowed by the finer textured layers that are in the lower part of the profile. As a result, the soil remains wet until late in spring and is slow to dry out after heavy rains.

Except for a small acreage that is covered by hardwoods, all of this soil is used for crops. The principal crops are corn, oats, red clover, ladino clover, and mixtures of alfalfa and bromegrass. (Capability unit IIIw-5)

Figure 6.—**Conifers planted on Gullied land. The trees stabilize the banks of the gullies and provide cover for wildlife.**

Gullied Land

Gullied land (Gu).—This miscellaneous land type occurs in small areas throughout the county, mainly along the edges of steep terraces. The areas are severely eroded; deep gullies have cut into the underlying soil materials. In many places the gullies have thoroughly dissected areas several acres in size. The soil materials in areas of Gullied land range from silty to sandy.

Where gullying has not been controlled, special management is required. Trees ought to be planted on many of the areas (fig. 6), and some areas need structures to control the gullies. The areas must be fenced to keep out livestock. They are, therefore, desirable for improvement as habitats for wildlife. (Capability unit VIIe-1)

Hesch Series

The Hesch series consists of well-drained soils on uplands. The soils are fine sandy loams or loams and overlie sand or weathered sandstone. Their slopes are generally between 12 and 20 percent, but in places they are either stronger or milder. The soils are mainly on valley slopes below areas of Steep stony and rocky land. A few scattered, less sloping areas occur in association with the Hixton soils. The Hesch soils are somewhat similar to the Hixton soils, but they have a thicker, darker colored surface layer.

In many places the Hesch soils receive runoff from higher lying upland soils. They are moderate in moisture-storing capacity. The steep areas are pastured, and the less sloping areas are cropped. Corn, oats, and alfalfa and bromegrass for hay are the crops commonly grown.

Hesch loam, 12 to 20 percent slopes, moderately eroded (HeD2).—This soil has a surface layer of very dark brown loam that is 8 to 10 inches thick. The subsoil is a compact loam to a depth of 30 inches. In the upper part of the subsoil, the loam is dark brown, but it grades to dark yellowish brown at a depth near 30 inches. The subsoil, below a depth of 30 inches, is yellowish-brown fine sandy loam. Beginning at a depth of 42 inches and extending downward for several feet is loose sand that contains fragments of sandstone. (Capability unit IVe-2)

Hesch loam, 6 to 12 percent slopes, moderately eroded (HeC2).—This soil is similar to Hesch loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes. It also has a slightly thicker surface layer and subsoil. (Capability unit IIIe-2)

Hesch loam, 20 to 30 percent slopes (HeE).—This soil has stronger slopes than Hesch loam, 12 to 20 percent slopes, moderately eroded. It is also less eroded. (Capability unit VIe-1)

Hesch loam, 20 to 30 percent slopes, moderately eroded (HeE2).—This soil has a slightly thinner surface layer and stronger slopes than Hesch loam, 12 to 20 percent slopes, moderately eroded. In addition, the profile is shallower over the underlying sand. (Capability unit VIe-1)

Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded (HcD2).—This soil has lost from one-third to two-thirds of its original surface layer through erosion. The present surface layer is black to very dark brown fine sandy loam, 8 to 10 inches thick. The subsoil, a dark-brown fine sandy loam or loam, extends to a depth of 28 inches. Below that depth is dark yellowish-brown fine sandy loam that grades to yellowish-brown, loose sand at a depth of 32 inches. The underlying sand contains fragments of sandstone. (Capability unit VIe-1)

Hesch fine sandy loam, 2 to 6 percent slopes (HcB).—This soil is mainly on low sandstone ridges. It has a thicker solum than Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded, and a surface layer that, in places, is as much as 14 inches thick. Its subsoil is also slightly thicker than that of Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded. There is less runoff on this soil, and the moisture-storing capacity is higher. This is the most productive of the Hesch fine sandy loams, but it occupies only a small acreage. (Capability unit IIIs-2)

Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded (HcC2).—This soil is similar to Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded. It differs only in degree of slope. (Capability unit IVe-7)

Hesch fine sandy loam, 20 to 30 percent slopes (HcE).—This soil has stronger slopes than Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded. It is also shallower over sand. (Capability unit VIIe-1)

Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded (HcE2).—This soil has a slightly thinner surface layer and subsoil than Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded, and it is shallower over the underlying sand. Like the other strongly sloping Hesch soils, it is used for pasture. (Capability unit VIIe-1)

Hixton Series

The Hixton series consists of well-drained, moderately deep fine sandy loams and loams. The solum of these soils is 22 to 36 inches thick and is underlain by loose sand or by weathered sandstone.

These soils are intermediate in texture between the Boone and Gale soils; they are less sandy than the Boone soils and less silty than the Gale. They are also somewhat similar to the Norden soils, but the Norden soils are underlain by greenish, shaly sandstone.

The Hixton soils are limited in moisture-storing capacity. Nevertheless, they are moderately productive.

The Hixton soils occur throughout Buffalo County on sandstone ridges and on ridges below areas capped by limestone. They are mainly in the northeastern part of the county on rolling sandstone uplands. In the areas that have the strongest slopes, the Hixton loams and Hixton fine sandy loams are so intermingled that they were not mapped separately.

In this county the steepest areas of Hixton soils are in timber or are used to grow forage crops. The less sloping areas are used to grow corn, oats, and alfalfa and bromegrass for hay.

Hixton loam, 12 to 20 percent slopes, moderately eroded (HsD2).—This soil has lost from one-third to two-thirds of its original surface layer through erosion. The present surface layer is dark grayish-brown, friable loam that is 4 to 7 inches thick. The upper part of the subsoil is dark yellowish-brown, compact loam that extends to a depth of 24 inches. The lower part is yellowish-brown fine sandy loam that grades to yellowish-brown, loose sand at a depth of 30 inches. The sand contains fragments of sandstone and grades to weathered sandstone at increasing depths.

This soil has moderately rapid runoff. It will be damaged seriously if erosion continues, as this would lower its moisture-storing capacity. As a result, yields would be lower. (Capability unit IVe-2)

Hixton loam, 2 to 6 percent slopes (HsB).—This soil is similar to Hixton loam, 12 to 20 percent slopes, moderately eroded, but it has a thicker surface layer, slightly greater total depth to sand, and milder slopes. The surface layer is 7 to 10 inches thick. (Capability unit IIe-2)

Hixton loam, 2 to 6 percent slopes, moderately eroded (HsB2).—This soil has milder slopes than Hixton loam, 12 to 20 percent slopes, moderately eroded. Its solum is also slightly thicker over sand. (Capability unit IIe-2)

Hixton loam, 6 to 12 percent slopes (HsC).—A thicker surface layer and milder slopes distinguish this soil from Hixton loam, 12 to 20 percent slopes, moderately eroded. (Capability unit IIIe-2)

Hixton loam, 6 to 12 percent slopes, moderately eroded (HsC2).—This soil is similar to Hixton loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes. (Capability unit IIIe-2)

Hixton loam, 6 to 12 percent slopes, severely eroded (HsC3).—The surface layer of this soil is yellowish brown and is thinner and more compact than that of Hixton loam, 12 to 20 percent slopes, moderately eroded. The soil is also lower in content of organic matter and in moisture-storing capacity, and it is more difficult to keep in good tilth. If it is not managed carefully, this soil is likely to be damaged seriously through further erosion. (Capability unit IVe-2)

Hixton loam, 12 to 20 percent slopes (HsD).—This soil is similar to Hixton loam, 12 to 20 percent slopes, moderately eroded. Its surface layer is slightly thicker. (Capability unit IVe-2)

Hixton loam, 12 to 20 percent slopes, severely eroded (HsD3).—This soil has lost more than two-thirds of its original surface layer through erosion. As a result, it has a thinner surface layer and a thinner solum than Hixton loam, 12 to 20 percent slopes, moderately eroded, and it is lower in moisture-storing capacity. Most of the acreage is used to grow crops for forage. (Capability unit VIe-1)

Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded (HfD2).—This soil has lost from one-third to two-thirds of the original surface layer through erosion. The present surface layer is dark grayish-brown fine sandy loam that is 4 to 6 inches thick. The upper part of the subsoil, consisting of dark-brown or dark yellowish-brown loam, extends to a depth of 22 inches. The lower part is yellowish-brown fine sandy loam that extends to a depth of 27 inches. Beneath the fine sandy loam is yellow, loose sand that contains fragments of sandstone. Weathered sandstone is at varying depths below the sand.

This soil is low in organic matter and is subject to severe damage by further erosion. It is moderately low in moisture-storing capacity. The soil is better suited to hay or pasture crops than to row crops or small grains. (Capability unit VIe-1)

Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded (HfB2).—This soil has milder slopes and a thicker surface layer and subsoil than Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded. Its solum is also slightly thicker over sand. A small acreage in which the soils are only slightly eroded is mapped with this soil. (Capability unit IIIs-2)

Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded (HfC2).—This soil is similar to Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes. (Capability unit IVe-7)

Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded (HfC3).—This soil has less than 4 inches of its original surface layer remaining, and it erodes rapidly if it is not managed carefully. The content of organic matter is low, and the subsoil is low in moisture-storing capacity. Crops grown on this soil are damaged by lack of moisture, especially during seasons when there is little rainfall or when the rainfall is poorly distributed. (Capability unit IVe-2)

Hixton fine sandy loam, 12 to 20 percent slopes (HfD).—This soil is less eroded than Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded, but the two soils are otherwise similar. (Capability unit VIe-1)

Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded (HfD3).—This soil has a thinner surface layer than Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded. It has lost more than two-thirds of the original surface layer through erosion, and the solum is only 20 to 24 inches thick over the underlying sand. The soil also contains less organic matter and is slightly shallower than Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded. As a result, it is more droughty. (Capability unit VIIe-1)

Hixton loam and fine sandy loam, 20 to 30 percent slopes (HtE).—This mapping unit consists of areas of Hixton loam and of Hixton fine sandy loam that are intricately mixed. The soils have lost less than one-third of the original surface layer through erosion. They vary more in depth, but are shallower over sand, than the Hixton loams and Hixton fine sandy loams that are mapped separately. As a result, these soils are slightly lower in moisture-storing capacity and are less productive than the other Hixton soils. They are used for pasture or timber. (Capability unit VIe-1)

Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded (HtE2).—This mapping unit is similar to Hixton loam and fine sandy loam, 20 to 30 percent slopes. The soils are more eroded than those soils, but they are used in the same way. (Capability unit VIe-1)

Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded (HtE3).—The soils in this mapping unit have lost more than two-thirds of the original surface layer through erosion. They are used about the same as Hixton loam and fine sandy loam, 20 to 30 percent slopes. (Capability unit VIIe-1)

Hixton loam and fine sandy loam, 30 to 40 percent slopes (HtF).—These soils have strong slopes, but they have lost less than one-third of the original surface layer through erosion. They are mainly in timber and are probably best suited to that use. (Capability unit VIIe-1)

Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded (HtF2).—The soils in this mapping unit have been eroded in varying degrees. In most of the areas, the surface layer is very thin or has been entirely removed through erosion. The soils are shallower over sand than the Hixton loams and Hixton fine sandy loams that are mapped separately. In most places sand is at a depth of only 22 inches.

A large amount of water runs off these areas, and the soils are low in moisture-storing capacity. The larger, less eroded areas can be used for pasture if they are managed carefully. Other areas should be planted to trees and managed to obtain wood products. (Capability unit VIIe-1)

Hubbard Series

The Hubbard series consists of sandy, somewhat droughty soils that are nearly level to gently undulating. The soils are well drained to somewhat excessively drained and are on the terraces of streams. Their solum is 24 to 36 inches thick over loose sand.

The Hubbard soils occur with the Sparta and Dakota soils. They are similar to those soils, but they are finer textured and less droughty than the Sparta soils and are coarser textured and have a lower moisture-storing capacity than the Dakota soils.

In Buffalo County the Hubbard loamy fine sands and Hubbard sandy loams are similar in characteristics and in management requirements; therefore, they were not mapped separately. Nearly all of the acreage is on the broad terraces along the Mississippi and Chippewa Rivers. Most of it is used to grow crops, mainly soybeans, corn, oats, and alfalfa. The soils are limited in moisture-storing capacity. During the years when there is little rainfall or when the rainfall is poorly distributed, crops are damaged by lack of moisture.

Hubbard soils, 0 to 2 percent slopes (HuA).—The soils in this mapping unit occur in broad, nearly level areas where they are but little affected by wind or water erosion. The surface layer is very dark brown sandy loam or loamy fine sand that is 10 to 14 inches thick. The subsoil, a dark-brown, slightly compact sandy loam, extends to a depth of 24 inches. It is underlain by dark yellowish-brown loamy sand that grades to yellowish-brown, loose sand at a depth of 36 inches. The sand is lighter colored at greater depths. (Capability unit IIIs-2)

Hubbard soils, 2 to 6 percent slopes (HuB).—The soils in this mapping unit are similar to Hubbard soils, 0 to 2 percent slopes, but they have gentle slopes and a slightly thinner surface layer. Also, the subsoil in many areas is a little coarser textured. As a result, these soils are slightly more droughty than Hubbard soils, 0 to 2 percent slopes. (Capability unit IVs-3)

Huntsville Series

The Huntsville series consists of moderately well drained to well drained soils on stream bottoms that are subject to overflow. The soils developed in deep silts that were washed down from soils on uplands and terraces and were redeposited on the nearly level bottoms below. They are characterized by a dark color that extends to a depth of as much as 36 inches. The soils contain a large amount of organic matter and are highly productive.

The Huntsville soils are seldom flooded enough so that crops are damaged or cultivation is hindered. Only one soil of this series, Huntsville silt loam, is mapped in Buffalo County.

Huntsville silt loam (Hv).—This soil occurs in small areas in narrow stream valleys throughout the county. The surface layer is very dark brown or black, friable silt loam that is 14 inches thick. It is underlain by dark-brown silt loam that extends to a depth of 42 inches and grades to dark-gray silt. In places, below a depth of 24 inches, the soil contains a few mottles that are yellowish brown. (Capability unit IIw-11)

Jackson Series

The Jackson series consists of moderately well drained, deep, silty soils that are nearly level to gently sloping. The soils occur on stream terraces. They are similar to the Curran soils, although the Curran soils are somewhat poorly drained, and to the Bertrand soils, which are well drained. Their slopes are mainly less than 2 percent.

These soils are high in moisture-supplying capacity and have medium internal drainage. They are highly productive. Except for a few small areas, all of the acreage is used for crops. The principal crops are corn, oats, and alfalfa and bromegrass grown for hay.

Jackson silt loam, 0 to 2 percent slopes (JaA).—This soil is but little eroded. It has a surface layer of very dark grayish-brown to dark-gray silt loam that is 8 to 11 inches thick. The upper part of the subsoil is dark-brown silty clay loam and extends to a depth of 32 inches. The lower part is yellowish-brown, light silty clay loam that grades to massive, smooth silt loam at a depth between 36 and 42 inches. The subsoil is mottled with brown and yellow at depths below 23 inches. The underlying material is silty and extends to a depth of several feet.

If crops are to make good yields on this soil, the areas that receive seepage water or runoff from the adjoining uplands may need drainage or diversions to protect them from excess water. (Capability unit I-1)

Jackson silt loam, 2 to 6 percent slopes (JaB).—This soil is similar to Jackson silt loam, 0 to 2 percent slopes, but it has gentle slopes. It also has a slightly thinner surface layer. (Capability unit IIe-1)

Jackson silt loam, 2 to 6 percent slopes, moderately eroded (JaB2).—This soil has lost from one-third to two-thirds of the original surface layer through erosion. The present surface layer is 4 to 8 inches thick and has a slightly lighter color than that of Jackson silt loam, 0 to 2 percent slopes. There is a slight risk of erosion. (Capability unit IIe-1)

Judson Series

The Judson series consists of deep, well-drained soils that occur in narrow drainageways, on fans at the outlets of the drainageways, and around the bases of valley slopes (fig. 7). The soils have formed in silty materials that washed or sloughed from the slopes above. They are subject to overflow, but flooding is seldom extensive enough to damage crops.

The Judson soils are similar to the Chaseburg soils, but they have a darker colored surface layer. They are somewhat similar to the Huntsville soils. The Huntsville soils, however, are in lower positions on nearly level overflow bottoms. The Judson soils have slopes of as much as 12 percent, but in most places slopes are between 2 and 6 percent. In a few areas there are small patches where the soil is covered by sandy overwash.

The Judson soils occur in small, scattered areas throughout the valleys of Buffalo County. They are highly productive. Except for a few small areas, they are used for crops. High yields are obtained from corn, oats, alfalfa and bromegrass grown for hay, and from other general farm crops.

Judson silt loam, 2 to 6 percent slopes (JuB).—The surface layer of this soil is very dark brown to very dark grayish-brown, friable silt loam that is 24 inches thick. The underlying material is silty. It is very dark grayish brown in the upper part but grades to yellowish brown at a depth of 42 inches. The silty material extends to depths of several feet. (Capability unit IIw-11)

Judson silt loam, 0 to 2 percent slopes (JuA).—This soil is more nearly level than Judson silt loam, 2 to 6 percent slopes, and it is more subject to flooding. The upper layers are also slightly darker and thicker. (Capability unit IIw-11)

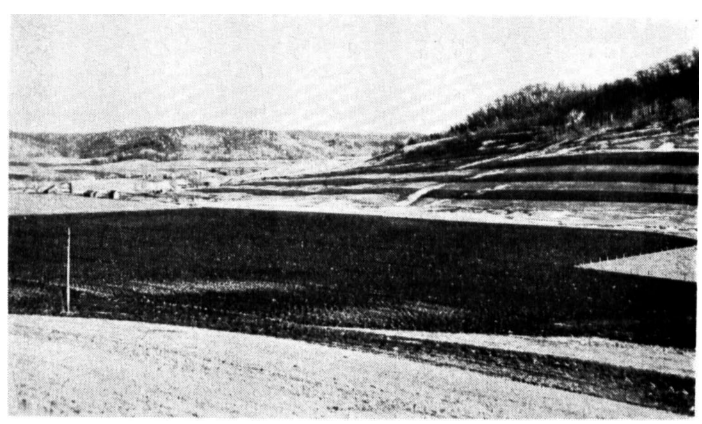

Figure 7.—Field of nearly level, dark-colored Judson and Richwood soils. In the background is a valley slope occupied by a dark-colored Lindstrom soil that has been contour stripcropped.

Judson silt loam, 6 to 12 percent slopes (JuC).—This soil is similar to Judson silt loam, 2 to 6 percent slopes, but it is lighter colored throughout and has stronger slopes. Because of its stronger slopes, this soil is less likely to be flooded than the other Judson soils. In some areas, however, channels made by runoff cut into the soil and form gullies. Diversions may be needed to protect these areas. Special structures to help check the formation of gullies may also be required. (Capability unit IIIe–1)

Lindstrom Series

The Lindstrom series consists of deep, well-drained, silty soils on valley slopes. The soils occur with the Fayette valleys soils, below areas of Steep stony and rocky land. Like the Fayette valleys soils, the Lindstrom soils in many places have a small amount of grit in the surface layer. Their surface layer is thicker and darker, however, than that of the Fayette valleys soils. Along the upper edges of the higher slopes, adjoining areas of Steep stony and rocky land, some areas of Lindstrom soils are covered by a layer of fine sand.

The Lindstrom soils are highly productive if they are managed properly. In this county they receive runoff from nearby uplands, and they are, therefore, susceptible to water erosion. The longer, steeper slopes are especially likely to be eroded. In areas where the slopes are favorable for cropping and where erosion can be controlled, the soils are suitable for all of the crops commonly grown in the area. Nearly all of the acreage is used for cultivated crops.

Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded (LsD2).—The surface layer of this soil is very dark brown silt loam that is 8 to 10 inches thick. The subsoil, a dark-brown, light silty clay loam, extends to a depth of 36 to 42 inches. It is underlain by dark yellowish-brown, smooth silt loam that extends to a depth of several feet. (Capability unit IVe–1)

Lindstrom silt loam, 6 to 12 percent slopes (LsC).—This soil is similar to Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes and a thicker surface layer. Its surface layer is as much as 12 inches thick. (Capability unit IIIe–1)

Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded (LsC2).—This soil is similar to Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. It differs in having milder slopes. (Capability unit IIIe–1)

Lindstrom silt loam, 20 to 30 percent slopes (LsE).—This soil has stronger slopes and a slightly thinner surface layer than Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. In a few places the slopes are as steep as 35 percent. (Capability unit VIe–1)

Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded (LsE2).—This soil has stronger slopes and a lighter colored, thinner surface layer than Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. It also has a thinner subsoil. In a few places the slopes are as steep as 35 percent. (Capability unit VIe–1)

Loamy Alluvial Land

Loamy alluvial land (Lw).—This miscellaneous land type occurs on bottom lands and consists of highly variable, medium-textured materials. The sediments from which it formed were transported by water that ran off the nearby stream terraces and uplands. In color the surface layer ranges from dark to light, and in texture, from fine sandy loam to silt loam.

Mapped with this land type are areas of Arenzville and Huntsville silt loams not large enough to delineate separately.

This land is suitable for crops and is used mainly for improved pasture or to grow corn and hay crops. Dikes, ditches, and sod waterways will improve the drainage and will help to control floodwaters. (Capability unit IIIw–14)

Loamy alluvial land, poorly drained (Lv).—This miscellaneous land type consists of mixed, medium-textured materials. The sediments from which it formed were carried by the waters of streams. They were deposited mainly on the broad flood plains of rivers, but smaller amounts were left in the narrower valleys of tributary streams. The vegetation consists mainly of sedges, bluegrass, marsh grass, alder, willow, aspen, river birch, soft maple, elm, and black ash.

This land is better suited to pasture than to cultivated crops. It can be left in trees, or is suitable for use as wildlife habitats. A few of the areas could be improved for pasture by providing dikes or ditches. (Capability unit Vw–15)

Marsh

Marsh (Mo).—This miscellaneous land type occurs mainly on the flood plains of the Mississippi and Chippewa Rivers and consists of sediments deposited by streams. It supports only rushes, sedges, cattails, and other plants that grow in wet areas. The water table is at or near the surface. Many of the areas are covered by floodwaters when the water is high. The land is used only for wildlife. (Capability unit VIIIw–1)

Medary Series

The Medary series consists of nearly level to gently sloping, well drained to moderately well drained soils formed in silt. The soils are on high stream terraces. They have a silty surface layer that overlies reddish clay. The clay extends to a depth of 42 inches.

The Medary soils occur with Bertrand and Jackson soils. They differ from the Bertrand and Jackson soils in that those soils are underlain by yellowish-brown, silty materials rather than silty clay.

In some areas, where the Medary soils lie just below areas of Steep stony and rocky land, the surface layer contains small amounts of sand. In these areas the soils also have thin streaks of sand throughout the profile and in the underlying material. In a few small areas, the surface layer is moderately dark colored.

In Buffalo County the Medary soils occur in small areas at the lower ends of the valleys of Waumandee Creek and the Buffalo River. They are used to grow general farm crops, which make moderately high yields. Alfalfa and other deep-rooted crops improve the clayey subsoil so that moisture can penetrate more rapidly. The soils respond well to management.

Medary silt loam, 0 to 2 percent slopes (MdA).—This soil is but little eroded. It is nearly level and has only fair surface drainage. The surface layer consists of dark-brown to dark grayish-brown silt loam that is 8 to 10 inches thick. The subsoil, a reddish-brown, sticky, heavy silty clay loam to clay, extends to a depth of 36 inches. It is underlain by reddish-brown, massive, plastic, clayey material that extends to a depth of several feet.

Because of the heavy texture of the subsoil, this soil is slow to warm in spring. This is especially true in areas where runoff from the adjacent uplands flows across the more nearly level areas. Ditches, waterways, or diversions may be needed in some areas. (Capability unit IIw–2)

Medary silt loam, 2 to 6 percent slopes, moderately eroded (MdB2).—This soil is similar to Medary silt loam, 0 to 2 percent slopes, but it has a slightly thinner, lighter colored surface layer. It also has gentle slopes and better surface drainage.

In some areas of this soil, plowing has mixed part of the reddish, clayey subsoil with the remaining surface layer. In these areas the soil is sticky, difficult to till when moist, and hard and cloddy when dry. (Capability unit IIe–1)

Meridian Series

The Meridian series consists of moderately deep, well-drained soils on the terraces of streams. The solum of these soils ranges in thickness from 24 to 36 inches and is underlain by loose sand.

These soils are in the same general areas as the Dakota, Gotham, Plainfield, and Sparta soils. They are lighter colored than the Dakota soils and are less sandy than the Gotham, Plainfield, and Sparta soils.

The Meridian soils occur in many stream valleys throughout Buffalo County. They are the most extensive along the Buffalo River and its tributaries. Because these soils are only moderately deep and are underlain by sand, they are moderate to low in moisture-storing capacity. During seasons when rainfall is well distributed, crops grown on them produce moderately high yields under good management. Nearly all of the acreage is used for cultivated crops.

Meridian loam, 0 to 2 percent slopes (MmA).—These soils have been but little damaged by erosion. The surface layer is very dark grayish-brown to dark grayish-brown, friable loam and is 7 to 10 inches thick. The subsoil consists of three layers. The upper part is dark-brown loam and extends to a depth of 18 inches. At a depth between 18 and 28 inches, the subsoil in most places is dark-brown sandy clay loam, but in some areas it is yellowish-brown loam. The lower part of the subsoil is a slightly compact sandy loam and extends to a depth of 36 inches. Below this, yellowish-brown, loose sand extends to a depth of several feet. (Capability unit IIs–1)

Meridian loam, 2 to 6 percent slopes (MmB).—This soil is similar to Meridian loam, 0 to 2 percent slopes, but it has gentle slopes and is slightly shallower over the underlying sand. (Capability unit IIe–2)

Meridian loam, 2 to 6 percent slopes, moderately eroded (MmB2).—This soil differs from Meridian loam, 0 to 2 percent slopes, in having gentle slopes and a thinner, more brownish surface layer. It is also shallower. The underlying sand is at a depth of about 24 to 32 inches. (Capability unit IIe–2)

Meridian loam, 6 to 12 percent slopes, moderately eroded (MmC2).—This soil has lost from one-third to two-thirds of the original surface layer through erosion. Thus, its surface layer is thinner and browner than that of the uneroded soil. This soil is also shallower over sand than the uneroded soil. Because it has stronger slopes, runoff is more extensive than on the other Meridian loams. (Capability unit IIIe–2)

Meridian fine sandy loam, 0 to 2 percent slopes (MeA).—This soil has been but little damaged by erosion. Its surface layer is very dark grayish-brown to dark grayish-brown fine sandy loam and is about 8 to 10 inches thick. The upper part of the subsoil, a yellowish-brown sandy clay loam to loam, extends to a depth of 25 inches. The lower part of the subsoil, between a depth of 25 and 28 inches, is yellowish-brown fine sandy loam that grades to deep, yellow, loose sand. In places the underlying sand contains thin layers of silt, clay, or sandy clay. (Capability unit IIIs–2)

Meridian fine sandy loam, 2 to 6 percent slopes (MeB).—This soil is similar to Meridian fine sandy loam, 0 to 2 percent slopes, but it has gentle slopes. It is also slightly shallower over sand. (Capability unit IIIs–2)

Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded (MeB2).—This soil has lost from one-third to two-thirds of the original surface layer through erosion. It is slightly shallower over sand than Meridian fine sandy loam, 0 to 2 percent slopes. (Capability unit IIIs–2)

Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded (MeC2).—This soil is similar to Meridian fine sandy loam, 0 to 2 percent slopes, but it is more sloping, has a thinner surface layer, and is shallower over the underlying sand. The surface layer is 4 to 8 inches thick.

This soil loses more water through runoff and is more susceptible to further erosion than the less sloping Meridian fine sandy loams. Areas along the edges of terraces are susceptible to gully erosion. A few acres of a more sloping, severely eroded soil are mapped with this soil. (Capability unit IVe–7)

Meridian loam, moderately well drained variant, 0 to 2 percent slopes (MnA).—This soil is on nearly level stream terraces and has been but little damaged by erosion. It is similar to Meridian loam, 0 to 2 percent slopes, but it is not so well drained. The lack of good drainage is caused by a temporary high water table. In spring, water rises into the subsoil, but it recedes during the summer. During periods of extended drought or when rainfall is poorly distributed, this soil is slightly droughty.

The surface layer is a very dark grayish-brown loam that is about 10 inches thick. The subsoil, a dark-brown loam, grades to loose, sandy layers at a depth of 28 to 34 inches. A few, small, yellowish-brown mottles are at a depth below 12 inches. The deep, wet sands below the subsoil have intensive mottling.

This soil is used for crops. If it is managed properly, good yields of corn, oats, and hay crops, such as red clover or a mixture of alfalfa and bromegrass, are obtained. The lack of good drainage in the subsoil does not reduce yields greatly, nor does it interfere with cultivation. In dry years it may even cause yields to be slightly higher than normal. The soil is so nearly level, however, that water often stands on the surface following rains and contributes to the drainage problem. Planting is delayed for short periods in spring, and the growth of plants is slowed. (Capability unit IIs–1)

Meridian loam, moderately well drained variant, 2 to 6 percent slopes (MnB).—This soil is similar to Meridian loam, moderately well drained variant, 0 to 2 percent slopes. Because it has stronger slopes, however, surface water moves off this soil more quickly. This soil is only slightly eroded. It is used principally for growing corn, oats, and hay crops, such as red clover or alfalfa-bromegrass. Yields are good under good management. (Capability unit IIe–2)

Norden Series

The Norden series consists of well-drained soils of uplands. The soils are underlain by greenish, shaly sandstone that is at a depth of 24 to 42 inches. The Norden soils occur in association with the Hixton and Gale soils and with the Fayette soils on valley slopes. They are somewhat similar to the Urne soils, which are steep and shallow.

The Norden soils are characterized by having formed exclusively over greenish-colored sandstone of the Franconia formation. In the northwestern part of the county, the Norden soils are on the tops of ridges, where the sandstone of the Franconia formation overlies other kinds of sandstone. Throughout the rest of the county, however, the Norden soils are on valley slopes or on secondary ridges below uplands capped by limestone.

The Norden soils have a wide range of slope, but the slopes are mainly between 12 and 30 percent. Where erosion can be controlled, the less sloping areas are used for crops, mainly corn, oats, and alfalfa and bromegrass grown for hay. The steeper areas are pastured or are used to grow trees.

Norden loam, 12 to 20 percent slopes, moderately eroded (NoD2).—This soil has lost from one-third to two-thirds of its original surface layer through erosion. The present surface layer is dark grayish-brown to very dark grayish-brown loam that is about 6 inches thick. The upper part of the subsoil is yellowish-brown gritty silt loam or very fine sandy loam and extends to a depth of 27 inches. The lower part of the subsoil is olive-brown gritty silt loam or very fine sandy loam and extends to a depth of 36 inches. Below are strata of partly weathered, greenish, shaly sandstone. Variations in the color and texture of the subsoil were caused by variations in the color and texture of the parent rock. (Capability unit IVe–2)

Norden loam, 6 to 12 percent slopes (NoC).—This soil is mainly on the narrow, sloping tops of secondary ridges. It is similar to Norden loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes and a thicker surface layer. The surface layer is 8 to 10 inches thick. (Capability unit IIIe–2)

Norden loam, 6 to 12 percent slopes, moderately eroded (NoC2).—This soil is similar to Norden loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes and a slightly thicker subsoil. A few acres of a severely eroded, sloping Norden loam are mapped with this soil. (Capability unit IIIe–2)

Norden loam, 20 to 30 percent slopes, moderately eroded (NoE2).—This strongly sloping soil is similar to Norden loam, 12 to 20 percent slopes, moderately eroded, but it is slightly shallower over weathered, greenish shaly sandstone. (Capability unit VIe–1)

Norden silt loam, 12 to 20 percent slopes, moderately eroded (GfD2).—This soil has lost from one-third to two-thirds of its original surface layer through erosion. The present surface layer is dark grayish-brown to very dark grayish-brown silt loam that is 4 to 8 inches thick. The upper part of the subsoil is brown silt loam, which extends to a depth of 12 inches. The lower part of the subsoil is a yellowish-brown silt loam or light silty clay loam that extends to a depth of 36 inches. At a depth below 36 inches is partly weathered, bedded, shaly sandstone. (Capability unit IVe–1)

Norden silt loam, 6 to 12 percent slopes, moderately eroded (GfC2).—This soil occurs mainly on narrow, secondary ridgetops throughout the county. It is similar to Norden silt loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes and a slightly thicker solum. A few acres of gently sloping and sloping, severely eroded soils were mapped with this soil. (Capability unit IIIe–1)

Norden silt loam, 12 to 20 percent slopes (GfD).—This soil is similar to Norden silt loam, 12 to 20 percent slopes, moderately eroded, but it has a slightly thicker surface layer. (Capability unit IVe–1)

Norden silt loam, 12 to 20 percent slopes, severely eroded (GfD3).—This soil has lost nearly all of its original surface layer through erosion. The color of the present plow layer is yellowish brown because part of the subsoil has been mixed with the remaining surface layer by plowing. (Capability unit VIe–1)

Norden silt loam, 20 to 30 percent slopes (GfE).—Although this soil has stronger slopes, it is less eroded than Norden silt loam, 12 to 20 percent slopes, moderately eroded. The two soils are similar, but this soil is slightly shallower over bedrock. (Capability unit VIe–1)

Norden silt loam, 20 to 30 percent slopes, moderately eroded (GfE2).—This soil is similar to Norden silt loam, 12 to 20 percent slopes, moderately eroded, but it has stronger slopes and is slightly shallower over bedrock. (Capability unit VIe–1)

Norden silt loam, 20 to 30 percent slopes, severely eroded (GfE3).—This soil has stronger slopes and is shallower over bedrock than Norden silt loam, 12 to 20 percent slopes, moderately eroded. It has lost much of the original surface layer through erosion; less than 4 inches of the original surface layer remains. (Capability unit VIIe–1)

Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded (NfD2).—The surface layer of this soil is dark-brown to dark grayish-brown fine sandy loam that is 7 inches thick. In most places the upper part of the subsoil is yellowish-brown silt loam and extends to a depth of 26 inches, but in places it is loam or very fine sandy loam. The lower part of the subsoil, at a depth between 26 and 30 inches, is light olive brown and ranges in texture from very fine sandy loam to fine sandy loam. At a depth below 30 inches is partly weathered, bedded, greenish, shaly sandstone. The variability of the parent materials causes the subsoil to vary in color, in texture, and in thickness. (Capability unit IVe–2)

Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded (NfB2).—This soil is similar to Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded, but it has milder slopes and a slightly thicker surface layer. (Capability unit IIe–2)

Norden fine sandy loam, 6 to 12 percent slopes, moderately eroded (NfC2).—Milder slopes distinguish this soil from Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded. (Capability unit IIIe–2)

Norden fine sandy loam, 12 to 20 percent slopes (NfD).—The surface layer of this soil is slightly thicker than that of Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded. Otherwise, the two soils are similar. (Capability unit IVe–2)

Norden fine sandy loam, 12 to 20 percent slopes, severely eroded (NfD3).—This soil has a thinner surface layer than Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded. Because of erosion, less than 4 inches of the original surface layer remains. (Capability unit VIe–1)

Orion Series

The Orion series consists of somewhat poorly drained, silty soils on bottom lands that are subject to flooding. The soils occur in the same general areas as the Arenzville soils, but they are not so well drained as those soils.

The Orion soils formed in materials laid down by floodwaters. As a result, the profile consists of many thin layers that vary slightly in color. In places thin layers of fine sand occur between the silty layers. In some areas the dark-colored surface layer of an old, buried soil is at a depth of 18 inches or more. Only one soil of this series, Orion silt loam, occurs in this county.

Orion silt loam (Or).—This soil occurs in small areas in the many valleys of streams throughout the county. Its surface layer is dark grayish-brown silt loam that is 8 to 12 inches thick. It overlies silty layers that are basically dark grayish brown but are highly mottled with yellow and brown. These silty layers extend to a depth of several feet. In places thin layers of very fine sand are between the silty layers throughout the profile. In some small areas sand or other materials deposited by streams are on the surface.

Where flooding can be controlled, Orion silt loam is used for crops. Yields are moderately high if proper management is used. The major crops are corn, oats, soybeans, clover, and alfalfa. In areas where flooding cannot be controlled, the soil is used for pasture. (Capability unit IIIw–14)

Peat and Muck

Peat and Muck consists of deep, dark-colored organic soils that are poorly drained. The soils are made up of the remains of grasses and sedges in various stages of decomposition. A few pieces of tamarack occur throughout the profile. The soils are on flats and in slight depressions, mainly on the broad bottoms of valleys. In Buffalo County most of the acreage is in the valley of Bear Creek, west of the city of Mondovi. This area is generally referred to as the Mondovi Marsh.

Peak and Muck differ only in the stage of decomposition of the plant remains. In the Muck soils the plants have decomposed to the extent that only a few of the original plant fibers remain. In areas of Peat and Muck, the water table is high and the soils are subject to flooding.

Peat and Muck, shallow (Pa).—This mapping unit consists of organic soils that are too shallow to be improved for crops. The soils are probably best used for pasture or wildlife. (Capability unit Vw–15)

Peat and Muck, deep (Pd).—These soils range from 3½ to about 7 feet in thickness. They are slightly acid to mildly alkaline. The original vegetation consisted of tamarack, sedges, and marsh grass. Fire and clearing for pasture or cultivation have nearly eliminated all of the original stand of tamarack.

These soils can be drained and used for crops. For good yields, however, they will need special management. (Capability unit IIIw–9)

Plainfield Series

The Plainfield series consists of deep, somewhat excessively drained soils on sandy stream terraces throughout the county. The terraces on which the soils formed are undulating or rolling because the soil materials were blown into mounds by wind. The soils are highly susceptible to erosion by wind.

The Plainfield soils are in the same general areas as the Meridian, Gotham, and Sparta soils. They are sandier and more droughty than the Meridian and Gotham soils and have a thinner, lighter colored surface layer than the Sparta soils.

Most of the acreage of Plainfield soils in Buffalo County is cultivated. The principal crops are corn, oats, clover, alfalfa, bromegrass, rye, and soybeans. Because the soils are low in moisture-holding capacity, yields are usually low, especially in seasons when rainfall is limited or is poorly distributed.

Plainfield loamy fine sand, 2 to 6 percent slopes (PfB).—This soil is on broad, undulating areas where the soil materials were blown into mounds by wind. The surface layer is dark grayish-brown to dark-brown loamy fine sand that ranges from 8 to 10 inches in thickness. The subsoil, a dark-brown loamy fine sand, extends to a depth of 12 to 24 inches. This is underlain by several feet of yellowish-brown, loose sand. (Capability unit IVs–3)

Plainfield loamy fine sand, 0 to 2 percent slopes (PfA).—Little or no slope and a slightly thicker surface layer distinguish this soil from Plainfield loamy fine sand, 2 to 6 percent slopes. The surface layer is as much as 12 inches thick. This soil is less susceptible to wind erosion than Plainfield loamy fine sand, 2 to 6 percent slopes, and there is little or no risk of erosion by water. (Capability unit IVs–3)

Plainfield loamy fine sand, 2 to 6 percent slopes, eroded (PfB2).—This soil differs from Plainfield loamy fine sand, 2 to 6 percent slopes, only in having a thinner surface layer. The surface layer is 4 to 8 inches thick. (Capability unit IVs–3)

Plainfield loamy fine sand, 6 to 12 percent slopes, eroded (PfC2).—This soil is more rolling than Plainfield loamy fine sand, 2 to 6 percent slopes. It is also more droughty and is more susceptible to erosion by both water and wind. (Capability unit VIs–3)

Plainfield loamy fine sand, loamy substrata variant (Ps).—This soil differs from the other Plainfield soils in having loamy, silty, or clayey layers 3 to 6 feet below the surface. These layers range from 1 to 6 inches in thickness. Slopes range from 0 to 2 percent. The soil has slightly better moisture-storing capacity than the other Plainfield soils. Crops grown on it make higher yields than they do on the other Plainfield soils. (Capability unit IVs–3)

Richwood Series

The Richwood series consists of deep, well-drained, silty soils on high stream terraces. The soils occur in the same general areas as the Toddville and Rowley soils, but they are better drained than the Toddville soils and are darker colored than the Rowley soils.

In Buffalo County the Richwood soils are mainly in the valleys of Little Waumandee and Waumandee Creeks. They have slopes of as much as 12 percent, but the nearly level areas are more extensive than the more sloping ones.

The Richwood soils are high in natural fertility and are highly desirable for farming. Nearly all of their acreage in this county is cultivated.

Richwood silt loam, 0 to 2 percent slopes (RcA).—This nearly level soil occurs in fairly broad areas that are generally 10 acres or more in size. It has little or no runoff and has not been damaged by erosion.

The surface layer is a black to very dark gray silt loam that is about 12 inches thick. The subsoil, a dark-brown silty clay loam, extends to a depth of 34 to 42 inches. Below is yellowish-brown, smooth silt loam that extends to a depth of several feet below the subsoil. (Capability unit I–1)

Richwood silt loam, 2 to 6 percent slopes (RcB).—This soil is similar to Richwood silt loam, 0 to 2 percent slopes, but it has gentle slopes and a slightly thinner surface layer. (Capability unit IIe–1)

Richwood silt loam, 6 to 12 percent slopes, moderately eroded (RcC2).—Stronger slopes and moderate erosion distinguish this soil from Richwood silt loam, 0 to 2 percent slopes. Also, the surface layer is browner and is only 5 to 8 inches thick. Because of the stronger slopes and greater amount of runoff, this soil is more susceptible to further erosion than the other Richwood soils. (Capability unit IIIe–1)

Riverwash

Riverwash (Re).—This miscellaneous land type consists of loose sand and gravel deposited by water. The materials were deposited mainly by streams or by water that flowed through intermittent drainageways. The areas are mainly along the major streams in the county. Because fresh soil materials are deposited from time to time, and because the soil materials are droughty, these areas support little or no useful vegetation.. (Capability unit VIIIs–1)

Rowley Series

The Rowley series consists of somewhat poorly drained soils on low terraces along streams. In this county these soils are flooded occasionally. Crops on the more nearly level areas are often damaged by excess water because both runoff and drainage through the subsoil are slow. These soils are associated with the Richwood soils, which are well drained, and with the Toddville soils, which are moderately well drained.

Erosion ranges from moderate to none in the Rowley soils. In some areas, however, as much as 6 inches of light- or dark-colored, silty material from the nearby uplands has washed onto these soils. Only one soil of this series, Rowley silt loam, is mapped in Buffalo County.

Rowley silt loam (Ro).—This soil is on low stream terraces. Its surface layer is very dark brown to black silt loam and is 10 to 16 inches thick. The upper part of the subsoil is dark grayish-brown silty clay loam and extends to a depth of about 21 inches. The lower part of the subsoil extends to a depth of about 38 inches and is grayish-brown silty clay loam mottled with yellowish brown or gray. Below the subsoil and extending to a depth of several feet is grayish-brown, light silty clay loam mottled with dark brown.

Drainage of this soil can be improved by tiling. It can also be improved by digging deep ditches, or by digging shallow ditches to drain off excess surface water, or both. The soil is highly productive if it is drained and well managed. (Capability unit IIw–1)

Sandy Alluvial Land

Sandy alluvial land (Sd).—This miscellaneous land type consists of mixed, sandy materials that have been transported by streams. The soil materials range from dark to light in color and from sandy loam to loose sand in texture. During periods when the areas are flooded, additional sandy materials are deposited. This causes the soil materials to be layered and to be highly variable. Some of the soils in this land type are well drained, but, because of the high water table, frequent flooding, or water seeping onto the areas from the adjacent uplands, the soils in places are only moderately well drained. The natural vegetation is mainly bluegrass, willow, and elm.

Because of the sandy texture of the soil materials, this land type is low in fertility and in moisture-storing capacity. It is used chiefly for permanent pasture or is wooded. Sod waterways and dikes will help to protect the areas from flooding. (Capability unit IVw–14)

Sandy alluvial land, poorly drained (Sa).—Most of this miscellaneous land type is on the flood plains of the larger rivers, but some areas are on narrow bottoms along tributary streams. It is flooded more frequently and is wetter than Sandy alluvial land. The vegetation consists principally of bluegrass, marsh grass, sedge, alder, willow, aspen, river birch, and soft maple, but there are a few scattered elms and black ash trees. The land is better suited to permanent pasture, trees, or wildlife than to cultivated crops. (Capability unit Vw–15)

Sparta Series

The Sparta soils are somewhat excessively drained and are on the broad, sandy terraces of streams. They consist of about 12 to 24 inches of loamy fine sand that overlies loose, deep sand blown into low mounds by wind.

The Sparta soils are associated with the Hubbard, Burkhardt, Dakota, Gotham, and Plainfield soils. They are sandier and more droughty than the Hubbard, Burkhardt, and Dakota soils and have a thicker, darker colored surface layer than the Gotham and Plainfield soils.

In Buffalo County the Sparta soils are used mainly for cultivated crops. Because of their low moisture-holding capacity, yields are generally low. Yields are especially low in seasons when there has been little rainfall or when rainfall has been poorly distributed. The principal crops are corn, oats, alfalfa, clover, rye, and soybeans.

Sparta loamy fine sand, 2 to 6 percent slopes (SpB).—This soil is but little eroded. Its surface layer is typically very dark brown and is 12 to 18 inches thick, but the color of the surface layer ranges from very dark grayish brown to black. Below the surface layer is dark-brown, slightly compact loamy fine sand that extends to a depth of about 24 inches. This overlies dark-brown, loose sand that extends to a depth of several feet. The sand is lighter colored with increasing depth. (Capability unit IVs–3)

Sparta loamy fine sand, 0 to 2 percent slopes (SpA).—This soil is similar to Sparta loamy fine sand, 2 to 6 percent slopes. It differs only in degree of slope. (Capability unit IVs–3)

Sparta loamy fine sand, 2 to 6 percent slopes, eroded (SpB2).—This soil is more eroded than Sparta loamy fine sand, 2 to 6 percent slopes. It also has a slightly thinner, more brownish surface layer. (Capability unit IVs–3)

Sparta loamy fine sand, 6 to 12 percent slopes (SpC).—This soil has stronger slopes and thinner layers than Sparta loamy fine sand, 2 to 6 percent slopes. It is also slightly more droughty. Therefore, crops grown on it make lower yields. If this soil is used for crops, it needs protection from erosion by wind and water. (Capability unit VIs–3)

Sparta loamy fine sand, 6 to 12 percent slopes, eroded (SpC2).—Sloping or rolling relief and a thinner, more brownish surface layer distinguish this soil from Sparta loamy fine sand, 2 to 6 percent slopes. This soil is also more droughty and is more likely to be damaged by erosion. (Capability unit VIs–3)

Sparta loamy fine sand, loamy substrata variant (Sr).—This soil differs from Sparta loamy fine sand, 0 to 2 percent slopes, in being underlain by loamy, silty, or clayey layers at a depth of 3 to 6 feet. These layers are 1 to 6 inches thick. This soil is higher in moisture-storing capacity than the other Sparta soils. As a result, crops grown on it make higher yields than crops grown on the other Sparta soils. (Capability unit IVs–3)

Sparta and Plainfield fine sands and Dune land (Ss).—This mapping unit consists of droughty sands that have been blown into mounds by winds. The dunes have slopes of 5 to 20 percent. Most of them have been stabilized and support thin stands of grass or scattered scrub oaks. There are still a few blowouts in the areas. Most of these have been planted to pines, but in some of them the sand is still being shifted by wind.

These soils are too droughty to be suitable for crops. Their use is limited to growing pine trees or other vegetation that withstands drought. (Capability unit VIIs–6)

Steep Stony and Rocky Land

Steep stony and rocky land (St).—This miscellaneous land type has slopes that are greater than 30 percent. It occurs on steep breaks below upland ridges and consists of areas of mixed, shallow soils in which there are many outcrops of rock (fig. 8). A few areas of better soils of the uplands, too small to delineate separately, are mapped with it.

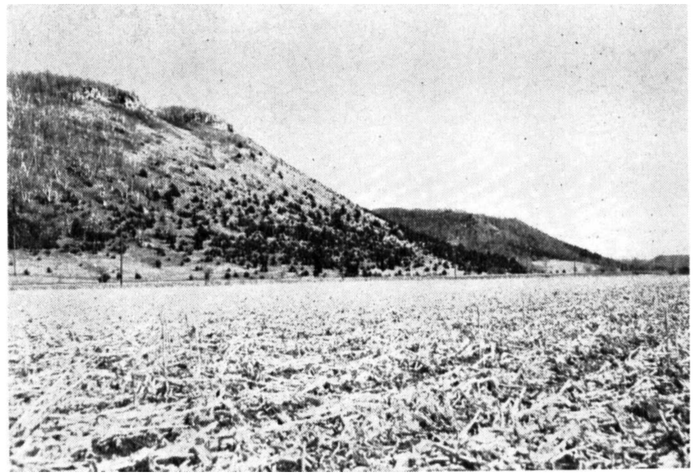

Figure 8.—**Steep stony and rocky land along State Highway 35 south of the town of Cochrane. The field in the foreground consists of Waukegan silt loam on a nearly level stream terrace.**

In this mapping unit the soil materials are highly variable in characteristics. They range in texture from sand to silt. In places the underlying bedrock is sandstone, and in other places it is limestone. On the north- and east-facing slopes, the areas are covered by soil materials that are deeper and more silty than the soil materials on the south- and west-facing slopes. Trees on those slopes yield better than those on south- and west-facing slopes.

This land type has a sparse cover of grass or is in trees. The areas furnish a large part of the habitats for wildlife. (Capability unit VIIs–6)

Tell Series

The Tell series consists of well-drained, silty soils underlain by sand at a depth ranging from 28 to 42 inches. The soils occur in the same general areas as the Bertrand and Waukegan soils. They differ from the associated soils in having formed in a thinner layer of silt than the Bertrand soils and in having a thinner, lighter colored surface layer than the Waukegan soils. The Tell soils are nearly level to gently sloping. They are mainly on high terraces in that part of the valley of the Buffalo River south of the place where the Buffalo River is joined by Elk Creek.

The Tell soils have moderate moisture-storing capacity. Nearly all of the acreage is cultivated, and yields are moderate to high. The principal crops are corn, oats, and alfalfa and bromegrass grown for hay.

Tell silt loam, 2 to 6 percent slopes (TeB).—The surface layer of this soil is a dark grayish-brown silt loam that is about 8 inches thick. The upper part of the subsoil is brown to dark yellowish-brown silt loam and extends to a depth of 15 inches. It overlies a layer of more compact, dark yellowish-brown silty clay loam that extends to a depth of 26 inches. The lower part of the subsoil is yellowish-brown, friable silt loam that extends to a depth of 30 inches. Below is yellow, loose sand that extends to a depth of several feet. (Capability unit IIe–2)

Tell silt loam, 0 to 2 percent slopes (TeA).—This soil is similar to Tell silt loam, 2 to 6 percent slopes, but it is more nearly level. It also has a slightly thicker surface layer. (Capability unit IIs–1)

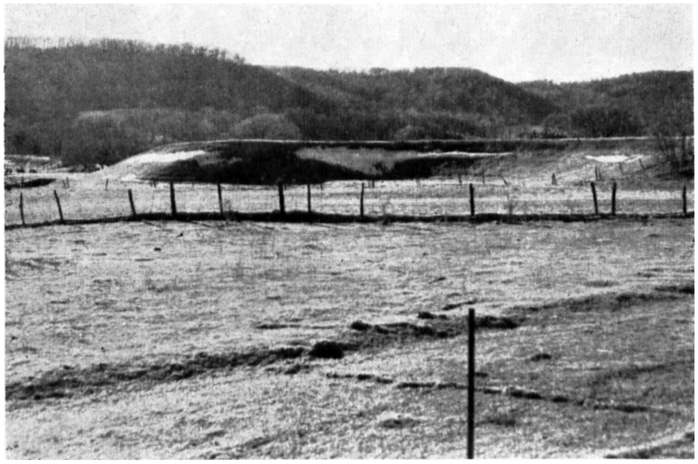

Figure 9.—**Terrace escarpment with a wooded area of Steep stony and rocky land in the background.**

Terrace Escarpments

Terrace escarpments consists of steep to very steep, long narrow areas that extend around the edges of stream terraces (fig. 9). In the upper part the soil materials have a sandy or silty texture, but they vary both in depth and in the type of underlying material. The areas are difficult to use and manage. Few of them are suitable for cultivated crops. The soils are highly susceptible to serious gullying.

Terrace escarpments, loamy (Tm).—This mapping unit consists of loams and silt loams that have slopes of 12 to 45 percent. It includes Medary, Richwood, Tell, and Bertrand silt loams and Meridian loams, which were all too limited in extent or too variable to map separately.

The soils are moderate in moisture-supplying capacity and have moderate natural fertility. Because of their steep slopes, however, and the severe hazard of erosion, they are not well suited to crops. Areas that are not too steep for cultivation can well be utilized by renovating them and using them for pasture. Other areas should be kept permanently in grass or trees. Most of the areas are now in pasture. (Capability unit VIIe–1)

Terrace escarpments, sandy (Tn).—This mapping unit consists of sandy soils that form narrow bands around the steep edges of stream terraces. Slopes range from 12 to 45 percent. The mapping unit includes Plainfield, Sparta, and Trempe soils and Meridian fine sandy loams that were too limited in extent or too variable to map separately.

The soils are low in moisture-holding capacity. They are susceptible to severe erosion and are not well suited to cultivation. The areas should be kept in permanent vegetation. They can be pastured, kept in trees, or used for wildlife. Some areas that are pastured can be improved for pasture. Care must be taken to prevent overgrazing. (Capability unit VIIs–6)

Toddville Series

The Toddville series consists of moderately well drained, deep, silty soils on terraces along streams. The soils formed in deep deposits of loess, but in places they are underlain by sand at a depth below 42 inches. The soils are associated with the Richwood and Rowley soils.

The Toddville soils contain a large amount of organic matter and have good moisture-supplying capacity. They are highly desirable for agriculture, and nearly all of the acreage in the county is used for crops.

Toddville silt loam, 0 to 2 percent slopes (ToA).—This soil has been but little damaged by erosion. Its surface layer is very dark brown to black, friable silt loam that ranges from 10 to 18 inches in thickness. The upper part of the subsoil is dark grayish-brown silt lōam, and the lower part is dark-brown silty clay loam. The subsoil has a few, small mottles of yellow and brown. It extends to a depth of about 36 inches. Below the subsoil and extending to a depth of several feet is dark-brown silt loam that is highly mottled with yellow and brown.

Normally, the surface drainage of this soil is adequate for crops. A few low spots and areas that receive runoff from higher lying areas need surface drainage. (Capability unit I–1)

Toddville silt loam, 2 to 6 percent slopes (ToB).—This soil is similar to Toddville silt loam, 0 to 2 percent slopes, but it has gentle slopes and a slightly thinner surface layer. It has good surface drainage. (Capability unit IIe–1)

Trempe Series

The Trempe series consists of somewhat excessively drained soils formed in reddish, sandy materials. The soils are on terraces along streams. In Buffalo County nearly all of their acreage is on the terrace near the Buffalo River. The soils are in an area that extends from the city of Mondovi east to the county line.

These soils are distinguished from other droughty, sandy soils of the terraces by the reddish color of their subsoil. They are susceptible to blowing by wind. The sloping areas are also subject to erosion by water.

In this county nearly all of the acreage of Trempe soils is used for crops. The principal crops are corn, oats, clover, alfalfa and bromegrass, soybeans, and rye. Yields are low unless favorable amounts of rainfall are well distributed throughout the growing season.

Trempe loamy fine sand, 0 to 2 percent slopes (TrA).—This soil does not have well-defined horizons in its profile. The upper part of the profile is dark reddish brown, but the color grades to yellowish red below a depth of 30 inches. Loamy fine sand extends to a depth of about 24 inches. Below is deep, loose sand that extends to a depth of several feet. Areas of this soil are fairly large. (Capability unit IVs–3)

Trempe loamy fine sand, 2 to 6 percent slopes (TrB).—This soil is similar to Trempe loamy fine sand, 0 to 2 percent slopes, but it has gentle slopes. (Capability unit IVs–3)

Trempe loamy fine sand, 2 to 6 percent slopes, eroded (TrB2).—This soil has stronger slopes and is more eroded than Trempe loamy fine sand, 0 to 2 percent slopes. Its surface layer also has a slightly lighter color. (Capability unit IVs–3)

Trempe loamy fine sand, 6 to 12 percent slopes, eroded (TrC2).—This soil is similar to Trempe loamy fine sand, 0 to 2 percent slopes, but it has stronger slopes. Also, because of erosion caused by water and wind, the surface layer is lighter colored than that of Trempe loamy fine sand, 0 to 2 percent slopes. (Capability unit VIs-3)

Urne Series

The Urne series consists of shallow, excessively drained soils that are underlain by greenish, shaly sandstone. The soils are on slopes of 20 to 40 percent, above areas of Fayette silt loam, valleys, and other soils on valley slopes. They lie below areas of Steep stony and rocky land. The Urne soils are mainly on steep knobs where they are so intermixed with areas of Norden soils that it was impractical to map them separately. They have a thinner solum and less uniform slopes than the Norden soils, which are described elsewhere in the report.

Because of the steepness of the slopes and the variability of the soils, the areas can be used only for forage crops or trees. If areas that are not too steep for renovation are improved, moderately high yields of forage are obtained. The soils are well suited to hardwoods. Trees make fair to good growth, depending on the exposure and on the supply of moisture.

Areas that have slopes of less than 30 percent are used mostly for pasture. Most of the steeper areas are wooded.

Urne-Norden loams, 30 to 40 percent slopes (UnF).—The soils in this mapping unit are mainly covered by trees and have been but little damaged by erosion. In areas under forest the surface layer is covered with a mat of partly decomposed leaves and twigs, about ½ inch to 1 inch thick.

The first layer of mineral soil consists of very dark brown to black loam. It contains a large amount of organic matter brought down by earthworms from the layer above. At a depth of 2 to 9 inches, the soil is dark grayish-brown loam that contains soft, greenish fragments of shaly sandstone. The layer just below grades from a yellowish-brown very fine sandy loam that contains many fragments of stone to greenish, shaly bedrock, which is at a depth of 24 inches. The layer just above the bedrock varies greatly in thickness. In some areas the weathered materials extend to a depth of 36 inches.

In most areas where these soils have been cultivated, the greenish, shaly sandstone, underlying the Urne soils, is exposed. (Capability unit VIIe-1)

Urne-Norden loams, 20 to 30 percent slopes (UnE).—These soils are similar to Urne-Norden loams, 30 to 40 percent slopes, but they have milder slopes. (Capability unit VIe-1)

Urne-Norden loams, 20 to 30 percent slopes, moderately eroded (UnE2).—These soils are less steep than Urne-Norden loams, 30 to 40 percent slopes, but they are more eroded. In many places the greenish, shaly sandstone is exposed. (Capability unit VIe-1)

Urne-Norden loams, 30 to 40 percent slopes, moderately eroded (UnF2).—These soils are more eroded than Urne-Norden loams, 30 to 40 percent slopes. In many places the greenish, shaly sandstone is exposed and fragments of sandstone are scattered on the surface. (Capability unit VIIe-1)

Wallkill Series

The Wallkill series consists of somewhat poorly drained, silty soils that overlie deposits of organic matter. The soils occur in nearly level areas or in depressions. They have formed in silty materials that have washed from soils of the nearby uplands and terraces and then have been deposited over layers of Peat and Muck. The thickness of the silty deposits ranges from 18 to 42 inches.

The Wallkill soils are frequently flooded and need drainage if crops are to make the best yields. If the soils are drained and managed properly, moderate to high yields of the crops commonly grown in the area are obtained. Only one soil of this series, Wallkill silt loam, is mapped in Buffalo County.

Wallkill silt loam (Wa).—The surface layer of this soil is dark-gray silt loam that is about 9 inches thick. It overlies thin layers of dark-gray to gray silt loam that extend to a depth of 18 to 42 inches. These layers are highly mottled with yellow, brown, and red. They overlie black muck or grassy and sedgy peat. In some areas this soil has thin layers of fine sand throughout the profile. (Capability unit IIIw-9)

Waukegan Series

The Waukegan series is made up of well-drained, silty soils on terraces along streams. The soils are underlain by sand at a depth of 24 to 42 inches. They occur in association with the Richwood and Dakota soils. The Waukegan soils have a thinner solum than the Richwood soils. Their texture is silty rather than being loamy like that of the Dakota soils. The soils are nearly level to gently sloping.

The Waukegan soils have moderate to good moisture-supplying capacity. They are high in natural fertility. In Buffalo County nearly all of the acreage of Waukegan soils is cropped, and high yields are obtained of the crops commonly grown. The soils can be farmed intensively if they are well managed.

Waukegan silt loam, 0 to 2 percent slopes (WkA).—This soil has little runoff and has been damaged but little by erosion. Its surface layer is very dark gray to black silt loam that is 8 to 12 inches thick. The upper part of the subsoil is generally dark yellowish-brown, heavy silt loam that extends to a depth of 24 inches. In some areas, however, it is a silty clay loam and has a slightly darker color than that in the typical soil. The lower part of the subsoil is a dark yellowish-brown loam and extends to a depth of 32 inches. It overlies dark-brown or yellowish-brown, deep, loose sand that is more yellowish with increasing depth. (Capability unit IIs-1)

Waukegan silt loam, 2 to 6 percent slopes (WkB).—This soil is similar to Waukegan silt loam, 0 to 2 percent slopes, but it has gentle slopes. It is also slightly susceptible to erosion. (Capability unit IIe-2)

Use and Management of the Soils

This section has several parts. The first explains the system of capability classification used by the Soil Conservation Service. In the next is a discussion of the basic practices of management that apply to all of the soils. Then, management of groups of soils, the capability units, is described. This is followed by a discussion of special management practices used for irrigated soils, and of special crops. Then estimated yields of principal crops are given, and, after that, information about the management of the soils for woodland and for engineering.

Capability Grouping of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on the limitations of the soils, on the risk of damage when they are used, and on the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes, there can be as many as four subclasses. The subclass is indicated by adding a small letter, *e*, *s*, *w*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; *w* means that water in or on the soil will interfere with the growth of plants or with cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *c*, used in only some parts of the country, indicates that the chief limitation is a climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *s*, *w*, and *c* because the soils in it have little or no erosion hazard but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for many statements about their management. Capability units are generally identified by Arabic numerals assigned locally, for example, IIe-1, IIIw-9 or IVe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations. The grouping does not take into consideration major, and generally expensive, landforming that would change the slope, depth, or other characteristics of the soil. It also does not take into consideration possible, but unlikely, major reclamation projects.

The capability classes, subclasses, and units in which the soils of Buffalo County are classified are defined in the listing that follows. The soils were assigned to capability units on a statewide basis. Because not all of the capability units in the State are represented in this county, the numbering of the units may not be consecutive. For example, no soils of capability unit IIw-3 have been recognized in Buffalo County; therefore, this capability unit is not discussed in this report.

Class I.—Soils that have few limitations that restrict their use.

- Unit I-1: Deep, moderately well drained to well drained, nearly level soils.

Class II.—Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.

- Subclass IIe.—Soils subject to moderate risk of erosion if they are not protected.
  - Unit IIe-1: Deep, moderately well drained to well drained, silty, gently sloping soils.
  - Unit IIe-2: Moderately deep, well drained to moderately well drained, gently sloping, loamy soils that are underlain by sand, sandstone, or limestone.
- Subclass IIs.—Soils that have moderate limitations of moisture capacity and tilth.
  - Unit IIs-1: Moderately deep, well drained and moderately well drained, nearly level soils that are underlain by loose sand.
- Subclass IIw.—Soils that have moderate limitations because of excess water.
  - Unit IIw-1: Deep, poorly drained, silty soils that are nearly level.
  - Unit IIw-2: Deep, somewhat poorly drained and moderately well drained, silty soils that are nearly level.
  - Unit IIw-11: Deep, well drained to moderately well drained, silty soils that are nearly level to gently sloping.

Class III.—Soils that have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

- Subclass IIIe.—Soils subject to severe erosion if they are cultivated and not protected.
  - Unit IIIe-1: Deep, silty, well-drained, sloping soils.
  - Unit IIIe-2: Moderately deep, well-drained, loamy, sloping soils that are underlain by loose sand or bedrock.
- Subclass IIIs.—Soils that have severe limitations of moisture capacity or tilth.
  - Unit IIIs-2: Predominantly well drained soils that are underlain by loose sand or by sandstone at a depth of 18 to 36 inches.
- Subclass IIIw.—Soils that have severe limitations because of excess water.
  - Unit IIIw-5: Poorly drained soils underlain by layers of loose, wet sand or fine sand and silt at a depth of 24 to 36 inches.
  - Unit IIIw-9: Poorly drained organic soils or soils underlain by organic materials.
  - Unit IIIw-14: Deep, moderately well drained to somewhat poorly drained soils that are subject to flooding.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, that require very careful management, or both.

- Subclass IVe.—Soils subject to very severe erosion if they are cultivated and not protected.
  - Unit IVe-1: Deep, well-drained, silty soils.

Unit IVe–2: Moderately deep, well-drained, loamy and silty soils that are underlain by limestone or sandstone at a depth of 2 to 3 feet.

Unit IVe–7: Shallow to moderately deep, well-drained to somewhat excessively drained soils that are underlain by loose sand or sandstone.

Subclass IVs.—Soils that have very severe limitations of low moisture capacity.

Unit IVs–3: Predominantly excessively drained or somewhat excessively drained, sandy soils underlain by loose sand or sandstone.

Subclass IVw.—Soils that have very severe limitations for cultivation because of excess water.

Unit IVw–14: Alluvial land subject to flooding.

Class V.—Soils not likely to erode but that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, to woodland, or to food and cover for wildlife.

Subclass Vw.—Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw–15: Poorly drained, nearly level, mixed sandy and loamy soils that are subject to frequent overflow.

Class VI.—Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife.

Subclass VIe.—Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe–1: Silt loams, loams, and sandy loams underlain by sand, sandstone, or limestone.

Subclass VIs.—Soils generally unsuitable for cultivation and limited for other uses by their moisture capacity, stones, or other features.

Unit VIs–3: Sandy, excessively drained, sloping soils.

Class VII.—Soils that have very severe limitations that make them unsuitable for cultivation, without major reclamation, and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe.—Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe–1: Shallow to deep, steep to very steep soils that are severely eroded or stony.

Subclass VIIs.—Soils very severely limited by moisture capacity, stones, or other soil features.

Units VIIs–6: Sandy, stony, and very steep soils.

Class VIII.—Soils and land types that have limitations that preclude their use, without major reclamation, for commercial production of plants and that restrict their use to recreation, wildlife, or water supply.

Subclass VIIIs.—Rock or soil materials that have little potential for production of vegetation.

Unit VIIIs–1: Riverwash.

Subclass VIIIw.—Extremely wet or marshy land.

Unit VIIIw–1: Marsh.

Basic Practices of Management

In the following pages management practices suitable for all of the soils of Buffalo County are discussed. In addition to these management practices, the farmer will also need to take into account all of the resources available on his particular farm. Besides the soils, he needs to consider livestock, machinery and other equipment, and the labor and capital available.

Maintain good tilth.—Maintaining good soil structure, or tilth, in the soils that are farmed is always important. It is especially important on steep slopes that are farmed. Studies made at the Upper Mississippi Valley Conservation Experiment Station near La Crosse show that soils having good structure take in and hold more water than soils in which structure has deteriorated. If good structure is maintained, erosion is less serious and more water is available for crops.

Good tilth is required for a firm, fine, granular seedbed. Such a seedbed is especially needed for alfalfa, grass, and other small-seeded crops. The sod-forming crops improve the structure, or tilth, of the soil. This is partly because such crops require no tillage, and partly because soil bacteria act to decay the organic matter or residue from the roots of the sod crop. In addition, sod-forming crops keep a cover on the land, thus helping to reduce erosion.

Control erosion.—Practices to control erosion are needed on all of the soils in the county. They are especially needed on steep or sandy soils. Contour stripcropping, terracing, and use of diversion ditches are the practices most generally used.

Contour stripcropping and terracing, designed and used correctly (*3*), greatly reduce the loss of soil by erosion. For contour stripcropping to be the most effective, a cropping system is needed in which hay crops are grown in strips alternating with corn or a small grain. If a hay crop is grown in the alternate strips, the runoff from the strips of corn or small grain spread out and the velocity of the water is slowed down; thus, most of the soil carried by the water settles out in the strips.

On long slopes the use of contour strips is limited. Much runoff from the upper part of the long slopes flows across the lower part of the slopes and is likely to cause erosion, even if strips of hay are alternated with strips of corn or grain. On long slopes, terraces or diversion ditches are needed to intercept the runoff and carry it safely from the field. Terraces and diversion ditches both intercept runoff, but a well-constructed terrace can be farmed. Diversion ditches, on the other hand, are larger, more permanent, and divide the field.

Terraces are generally not satisfacory on slopes of more than 12 percent, but diversion ditches can be constructed on slopes of as much as 25 percent. Terraces and diversion ditches both require maintenance to keep the channels open and in good operating condition.

Management by Capability Units

Soils in one capability unit have about the same limitations and similar risks of damage. The soils in one unit, therefore, need about the same kind of management, though they may have been formed from different kinds of parent material and in different ways. The capability units are described in the following pages, and management is suggested for the soils of each unit.

CAPABILITY UNIT I–1

This unit consists of deep, moderately well drained to well drained, nearly level soils that are silty and moderately permeable. The soils are high in moisture-supplying capacity. They have good tilth, and tilth is easy to maintain. The following soils are in this unit:

Bertrand silt loam, 0 to 2 percent slopes.
Jackson silt loam, 0 to 2 percent slopes.
Richwood silt loam, 0 to 2 percent slopes.
Toddville silt loam, 0 to 2 percent slopes.

These soils are easy to farm and are highly desirable for agriculture. Nearly all of the acreage is used for crops, and only a small acreage is used for pasture and woodlots. In addition to general crops, the soils are well suited to sweet corn, peas for canning, beans, potatoes, and other special crops. They are also suited to permanent pasture and trees and can be used as wildlife habitats.

If a good supply of plant nutrients is maintained, these soils can be cropped intensively without risk of damage. Keeping a good supply of organic matter in the soils is also beneficial.

If crop residues are removed from the field, suggested cropping systems are—

2 years of row crops followed by 1 year each of a small grain and hay.
3 years of row crops followed by 1 year of a small grain and 2 years of hay.
2 years of row crops followed by 1 year of a small grain and 2 years of hay.

If the crop residues are left on the field or rye or a similar cover crop is plowed under, these soils can be used to grow row crops year after year.

Crops on these soils respond well if lime and fertilizer are added. Areas that have been cropped are acid if they have not received regular applications of lime.

CAPABILITY UNIT IIe-1

This unit consists of deep, moderately well drained to well drained, silty soils that are gently sloping. The soils are moderate to high in moisture-supplying capacity and are moderately permeable. They are easy to keep in good tilth. The following soils are in this unit:

Bertrand silt loam, 2 to 6 percent slopes.
Bertrand silt loam, 2 to 6 percent slopes, moderately eroded.
Downs silt loam, 2 to 6 percent slopes.
Downs silt loam, 2 to 6 percent slopes, moderately eroded.
Downs silt loam, benches, 2 to 6 percent slopes.
Dubuque silt loam, deep, 2 to 6 percent slopes.
Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded.
Fayette silt loam, uplands, 2 to 6 percent slopes.
Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded.
Fayette silt loam, valleys, 2 to 6 percent slopes.
Jackson silt loam, 2 to 6 percent slopes.
Jackson silt loam, 2 to 6 percent slopes, moderately eroded.
Medary silt loam, 2 to 6 percent slopes, moderately eroded.
Richwood silt loam, 2 to 6 percent slopes.
Toddville silt loam, 2 to 6 percent slopes.

These soils are used mainly to grow corn, small grains, grasses, and legumes, but a small acreage is in permanent pasture and woodlots. The soils are well suited to special crops. They are also well suited to permanent pasture and trees and to use as wildlife areas.

Areas of these soils that are cultivated are likely to be damaged by water erosion. The soils need management practices that will protect them from erosion and that will maintain a good supply of plant nutrients and organic matter.

Suggested management practices and cropping systems are—

Contour stripcropping: 2 years of row crops followed by 1 year of a small grain and 2 years of hay.
Contour stripcropping with wheel-track planting: 2 years of row crops, planted in the wheel tracks of the tractor followed by 1 year of a small grain and 2 years of hay.
Terracing: 2 years of row crops followed by 1 year each of a small grain and hay.
Terracing with wheel-track planting: 3 years of row crops followed by 1 year of a small grain and 2 years of hay.

If no special practices are used to protect the soils, a suitable cropping system is—

1 year each of a row crop and small grain and then 3 years of hay.

Crops on these soils respond well if lime and fertilizer are added. Areas that have been cropped are acid if they have not received regular applications of lime.

CAPABILITY UNIT IIe-2

This unit consists of moderately deep, well drained to moderately well drained, gently sloping, loamy soils over sand, sandstone, or limestone. The soils are moderately permeable. If normal good farming practices are used, the soils can be kept in good tilth. They are moderate in moisture-supplying capacity. The following soils are in this unit:

Dakota loam, 2 to 6 percent slopes.
Dubuque silt loam, 2 to 6 percent slopes.
Dubuque silt loam, 2 to 6 percent slopes, moderately eroded.
Gale silt loam, 2 to 6 percent slopes, moderately eroded.
Hixton loam, 2 to 6 percent slopes.
Hixton loam, 2 to 6 percent slopes, moderately eroded.
Meridian loam, 2 to 6 percent slopes.
Meridian loam, 2 to 6 percent slopes, moderately eroded.
Meridian loam, moderately well drained variant, 2 to 6 percent slopes.
Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded.
Tell silt loam, 2 to 6 percent slopes.
Waukegan silt loam, 2 to 6 percent slopes.

These soils are used mainly to grow corn, small grains, grasses, and legumes, but a fairly large acreage on narrow ridgetops is used for woodland or pasture. The soils are also suitable as wildlife areas.

Areas of these soils that are cultivated are subject to erosion by water. The soils are somewhat droughty, especially during periods of low rainfall or when rainfall is poorly distributed. To prevent the soils from deteriorating and to produce good yields, management practices are needed that will help to control erosion and that will maintain a good supply of plant nutrients and organic matter.

Suggested management practices and cropping systems are—

Contour stripcropping: 1 year each of a row crop and small grain followed by 2 or 3 years of hay.
Contour stripcropping with wheel-track planting or terracing: 2 years of row crops followed by 1 year of a small grain and then 2 years of hay.
Terracing with wheel-track planting: 3 years of row crops followed by 1 year of a small grain and then by 2 years of hay.

If no special practices are used to protect the soils, a suitable cropping system is—

1 year each of a row crop and small grain followed by 3 years of hay. On slopes longer than 200 feet, hay should be grown an additional year.

Crops on these soils respond well if lime and fertilizer are added. Areas that have been cropped are acid if they have not received regular applications of lime.

CAPABILITY UNIT IIs-1

This unit consists of moderately deep, well drained and moderately well drained soils that are nearly level. The soils overlie loose sand and are on high benches along streams. They are moderately permeable and have moderate moisture-supplying capacity. If good farming practices are used, the soils can be kept in good tilth. The following soils are in this unit:

Dakota loam, 0 to 2 percent slopes.
Meridian loam, 0 to 2 percent slopes.
Meridian loam, moderately well drained variant, 0 to 2 percent slopes.
Tell silt loam, 0 to 2 percent slopes.
Waukegan silt loam, 0 to 2 percent slopes.

These soils are easy to farm. They are used primarily to grow corn, small grains, grasses, and legumes, but some areas are in soybeans. Only a small acreage is in permanent pasture and woodlots, but the soils are well suited to those uses and are also suitable as wildlife areas.

Because the soils are only moderately deep over sand, they are slightly droughty, especially during periods of low rainfall. Therefore, a cropping system that will help maintain a good supply of organic matter is especially beneficial. The organic matter will help to increase the moisture-supplying capacity of the soils.

If the crop residues are removed from the field, a suitable cropping system is—

1 year each of a row crop and small grain followed by 2 years of hay.

If the crop residues are left on the field, a suitable cropping system is—

2 or 3 years of row crops followed by 1 year each of a small grain and hay.

Crops on these soils respond well if lime and fertilizer are added. Areas that have been cropped are acid if they have not received regular applications of lime.

CAPABILITY UNIT IIw-1

This unit consists of deep, silty soils that are poorly drained. The soils are in nearly level areas or in slight depressions. They are on low terraces along streams and on bottoms adjacent to streams. The soils have a thick, dark surface layer that contains a large amount of organic matter. They have moderately slow permeability. The following soils are in this unit:

Ettrick silt loam.
Rowley silt loam.

Because of their poor drainage and susceptibility to flooding, large areas of these soils are used for permanent pasture. A smaller acreage is in trees or is covered by brush. The principal plants in the pastures are bluegrass, marsh grass, and sedge. Areas that can be cultivated are used intensively for row crops, but they are also well suited to small grains, grasses, and legumes. The areas are also suitable for wildlife.

These soils require drainage if they are to be tilled easily and if good yields are to be obtained. Tile or closely spaced open ditches will provide adequate drainage. Surface ditches, waterways, dikes, and diversion ditches can be used to help remove excess water.

It is important to maintain good structure in these soils so that there will be adequate pore space for water to move downward to the drainage system. The structure can be improved by growing grasses and legumes, by adding barnyard manure or green manure, and by working the soil only when it is dry enough so that it will not puddle. If the soils are adequately drained and fertilized, and if other good management practices are followed, tilth is good and high yields are obtained under intensive cropping.

Suggested cropping systems are—

3 years of row crops followed by 1 year of a small grain and 2 years of hay.
2 years of row crops followed by 1 year each of a small grain and hay.
1 year each of a row crop, small grain, and hay.

Crops on these soils respond well if fertilizer is added. If the soils have not been cropped, their reaction is nearly neutral. If they have been cropped intensively for several years, however, they are likely to need lime.

CAPABILITY UNIT IIw-2

This unit consists of deep, nearly level, silty soils that are on terraces along streams. The Curran soil is somewhat poorly drained, and the Medary soil is moderately well drained. The soils have slow permeability. The following soils are in this unit:

Curran silt loam.
Medary silt loam, 0 to 2 percent slopes.

Because of their slow internal drainage and nearly level relief, these soils dry out slowly in spring and after periods of excessive rainfall. Some areas are ponded for short periods. If the soils are worked when wet, they are likely to be damaged seriously as the result of puddling. They are also difficult to till after the organic matter has been depleted from the surface layer. The soils in this unit are high in moisture-supplying capacity.

Except for a few small areas of these soils that are wooded or in permanent pasture, nearly all of the acreage is under cultivation. The principal crops are corn, small grains, grasses, and legumes. Alfalfa is grown on some areas that have been drained, but on many areas of the Curran soil that have not been drained, red clover or ladino clover is grown instead of alfalfa.

Where flooding is not a problem, the Medary soil can be farmed without special practices to drain or conserve it. Most areas of the Curran soil, however, require drainage or protection from overflow if good yields are to be obtained. Surface ditches, diversion ditches, and grassed waterways can be used to dispose of excess water. Adding barnyard manure, turning under a green-manure crop, returning crop residues to the soil, or applying commercial fertilizer all help to maintain good tilth and a good supply of plant nutrients.

Suggested cropping systems are—

1 year each of a row crop and small grain followed by 2 years of hay.
2 years of row crops and 1 year of a small grain followed by 2 years of hay.
1 year each of a row crop, small grain, and hay.

Crops on these soils generally respond well if lime and fertilizer are added. Areas that have been cropped are acid if lime has not been applied.

CAPABILITY UNIT IIw-11

This unit consists of deep, well drained to moderately well drained, silty soils that are nearly level to gently sloping. The soils are on flood plains along streams and on the bottoms of narrow valleys. They also occur on fans at the outlets of streams that flow from the uplands and at the outlets of upland draws. The soils are moderately permeable and are easy to keep in good tilth. They are high in moisture-supplying capacity. The following soils are in this unit:

Arenzville silt loam.
Chaseburg silt loam, 0 to 2 percent slopes.
Chaseburg silt loam, 2 to 6 percent slopes.
Huntsville silt loam.
Judson silt loam, 0 to 2 percent slopes.
Judson silt loam, 2 to 6 percent slopes.

Most areas of these soils are under cultivation, but a small acreage is used for permanent pasture and woodlots. The principal crops are corn, small grains, grasses, and legumes. The soils are easy to farm and are high in natural fertility. Therefore, the cropping system used on many areas contains a high proportion of row crops.

Except for some gullying and cutting of channels, these soils are not subject to serious damage by erosion. They are susceptible to slight damage, however, from overflow. When streams overflow, a thin layer of sediments is deposited over the surface in some areas. Where needed, dikes, grassed waterways, and diversion ditches can be used to protect the soils from floodwaters.

Suggested management practices and cropping systems are—

1 year each of a row crop, small grain, and hay.
1 year each of a row crop and small grain followed by 2 years of hay.

On the nearly level soils in this unit, continuous row crops can be grown if a high level of fertility and good tilth are maintained and if a large amount of organic matter is kept in the soil. If row crops are to be grown year after year, plant residues or a green-manure crop ought to be plowed under and large amounts of barnyard manure should be added. Areas of these soils that are inaccessible or that are subject to frequent flooding are better suited to permanent pasture and trees or to use as wildlife areas than to other uses.

Crops on these soils generally respond well if fertilizer is added. If the soils have not been cropped, however, their reaction is nearly neutral. Unless they have been cropped intensively for many years, little or no lime will be required.

CAPABILITY UNIT IIIe-1

This unit is made up of deep, silty, well-drained, sloping soils. The soils are mainly on uplands and on terraces along streams, but the Chaseburg and Judson soils are on sloping bottom lands. The soils are moderately permeable and are high in moisture-supplying capacity. They are easy to keep in good tilth if good management practices are used. The following soils are in this capability unit:

Bertrand silt loam, 6 to 12 percent slopes.
Bertrand silt loam, 6 to 12 percent slopes, moderately eroded.
Chaseburg silt loam, 6 to 12 percent slopes.
Downs silt loam, 6 to 12 percent slopes, moderately eroded.
Downs silt loam, benches, 6 to 12 percent slopes, moderately eroded.
Dubuque silt loam, deep, 6 to 12 percent slopes.
Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded.
Fayette silt loam, uplands, 6 to 12 percent slopes.
Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded.
Fayette silt loam, valleys, 6 to 12 percent slopes.
Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded.
Judson silt loam, 6 to 12 percent slopes.
Lindstrom silt loam, 6 to 12 percent slopes.
Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded.
Norden silt loam, 6 to 12 percent slopes, moderately eroded.
Richwood silt loam, 6 to 12 percent slopes, moderately eroded.

These soils are mainly under cultivation, but some of the acreage is used for permanent pasture and woodlots. The soils are well suited to those uses and to use as wildlife areas. The principal crops are corn, small grains, grasses, and legumes.

In areas that are cultivated, these soils are highly susceptible to erosion caused by runoff and are subject to gullying. The soils need practices to protect them from erosion. They also need practices to keep them high in fertility and to maintain the content of organic matter.

Suggested management practices and cropping systems are—

Contour stripcropping: 1 year each of a row crop and small grain followed by 2 years of hay.
Contour stripcropping with wheel-track planting or terracing: 2 years of row crops and 1 year of a small grain followed by 2 years of hay.
Terracing with wheel-track planting: 2 years of row crops followed by 1 year each of a small grain and hay.

If no special management practices are used, a suitable cropping system is—

1 year of a small grain and 2 or more years of hay.

On areas of these soils that are cropped or used for improved legume pasture, lime is required for best yields. Crops grown on the soils also respond well if fertilizer is added.

CAPABILITY UNIT IIIe-2

This unit consists of moderately deep, well-drained, loamy, sloping soils that are underlain by loose sand or bedrock. The soils are moderately permeable and can be kept in good tilth if good management is used. They are moderate in moisture-supplying capacity. The following soils are in this unit:

Dubuque silt loam, 6 to 12 percent slopes.[3]
Dubuque silt loam, 6 to 12 percent slopes, moderately eroded.[3]
Gale silt loam, 6 to 12 percent slopes, moderately eroded.
Hesch loam, 6 to 12 percent slopes, moderately eroded.
Hixton loam, 6 to 12 percent slopes.
Hixton loam, 6 to 12 percent slopes, moderately eroded.
Meridian loam, 6 to 12 percent slopes, moderately eroded.
Norden loam, 6 to 12 percent slopes.
Norden loam, 6 to 12 percent slopes, moderately eroded.
Norden fine sandy loam, 6 to 12 percent slopes, moderately eroded.

Most areas of these soils are under cultivation. A fairly large acreage of Dubuque, Hixton, and Norden soils, however, is on narrow ridges, in small tracts on the

[3] Areas in which limestone is at a depth of less than 18 inches are not suitable for terracing.

ends of ridges, or in other positions or shapes that are inaccessible or that are difficult to till. These areas are used for permanent pasture or woodlots. The soils are well suited to those uses and are also suitable for use as wildlife areas.

In the areas that are cultivated, these soils are highly susceptible to water erosion. Because of their moderate depth, the loss of additional soil material through erosion would reduce the thickness of the root zone, further reduce the moisture-supplying capacity, and make the soils less productive.

The soils are subject to gullying. Gullying is especially damaging if erosion has removed all of the soil material above the substratum because the substratum is unfavorable for the growth of plants. Management practices that protect the soils from gullying are essential if tilled crops are to be grown. Adding barnyard manure or turning under a green-manure crop and crop residues will help to maintain favorable moisture-supplying capacity in the soils.

Suggested management practices and cropping systems are—

Contour stripcropping: 1 year each of a row crop and small grain followed by 3 years of hay.
Contour stripcropping with wheel-track planting or terracing: 1 year each of a row crop and small grain followed by 2 years of hay.
Terracing with wheel-track planting: 2 years of row crops followed by 1 year of a small grain and 2 years of hay.

If no special practices are used to protect the soils, a suitable cropping system is—

1 year of a small grain and 3 or more years of hay.

Crops on these soils respond well if lime and fertilizer are added. Areas that have been cropped are acid if lime has not been added.

CAPABILITY UNIT IIIs-2

This unit is made up predominantly of well-drained soils that are underlain by loose sand or sandstone at a depth of 18 to 36 inches. The soils are nearly level to gently sloping. They are on uplands and on terraces along streams. Permeability is moderately rapid, and the soils are moderately low to low in moisture-supplying capacity.

Soils in this unit are:

Burkhardt sandy loam, 0 to 2 percent slopes.
Burkhardt sandy loam, 2 to 6 percent slopes.
Dakota fine sandy loam, 0 to 2 percent slopes.
Dakota fine sandy loam, 2 to 6 percent slopes.
Dakota fine sandy loam, 2 to 6 percent slopes, moderately eroded.
Hesch fine sandy loam, 2 to 6 percent slopes.
Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded.
Hubbard soils, 0 to 2 percent slopes.
Meridian fine sandy loam, 0 to 2 percent slopes.
Meridian fine sandy loam, 2 to 6 percent slopes.
Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded.

These soils are easy to till, but they are moderately low in fertility. Good tilth can be maintained by adding frequently those amendments that supply organic matter. Nearly all of the acreage is under cultivation, but a small part is used for permanent pasture and woodlots. The principal crops are corn, soybeans, small grains, grasses, and legumes.

The sandy texture and moderate depth of the soils cause the areas to be somewhat droughty, especially during periods when rainfall is poorly distributed. If the soils are cultivated, they are likely to be damaged by erosion caused by both wind and water. The Burkhardt and Hubbard soils are slightly more susceptible to wind erosion and are slightly more droughty than the other soils. Therefore, they need more careful managment if they are cultivated.

If the soils in this unit are to be cropped safely over a long period, and if good yields are to be obtained, special management practices are required. These practices include adding barnyard manure and plowing under green-manure crops and crop residues to improve the moisture-holding capacity of the soils. These practices also help to protect the soils from erosion by wind and water. Shelterbelts planted in areas where the soils are vulnerable to erosion by wind will also give protection from warm, drying winds during the growing season. Using a shelterbelt on the more nearly level areas, in conjunction with stripcropping, is the best practice to prevent damage from wind. With this practice, hay crops are grown in strips alternating with strips of small grain or row crops.

On sloping areas contour stripcropping or using terraces and diversions will help to control water erosion. Adequate amounts of fertilizer must be applied for good yields. The soils in this unit respond well to supplemental irrigation during periods when rainfall is low or poorly distributed.

If special management practices are used, a suitable cropping system for these soils is—

1 year each of a row crop and small grain followed by 2 years of hay.

CAPABILITY UNIT IIIw-5

This unit consists of poorly drained soils underlain by layers of loose, wet sand or fine sand and silt at a depth of 24 to 36 inches. The soils are on flats and in slight depressions on low stream terraces and on the adjoining bottom lands. They have a high water table and slow surface drainage. The content of organic matter is moderately high, and the soils are easy to work if they are adequately drained. The following soils are in this unit:

Duelm fine sandy loam.
Ettrick silt loam, sandy substratum.
Granby sandy loam.
Granby fine sandy loam, stratified substratum variant.

The Duelm and Granby soils are used mainly for field crops. Soybeans are grown on a fairly large acreage of the Duelm soil, but other row crops are also grown extensively, and small grains, red clover, and ladino clover. The Ettrick soil lacks adequate drainage and protection from overflow. Therefore, it is largely in permanent pasture or is used as wildlife areas. All of these soils are well suited to pasture or to use as wildlife areas.

The soils in this unit must be drained if good yields are to be obtained. Many areas also require protection from overflow. In addition to drainage, management practices to build up a good supply of plant nutrients and organic matter in the soils are essential for good yields. Drainage ditches, diversion ditches, and grassed waterways all help to improve drainage. The Duelm soil is near the Mississippi River, however, and its water table is influenced by the water level of the river and its sloughs. Therefore, the Duelm soil is difficult to drain satisfactorily.

Suggested cropping systems for these soils are—

1 year each of a row crop, small grain, and hay.
2 years of row crops, 1 year of a small grain, and 2 years of hay.
1 year each of a row crop and small grain and 2 years of hay.

If these soils have been adequately drained, crops grown on them respond well to applications of fertilizer. The soils are naturally medium acid to nearly neutral. The requirement for lime depends on past cropping systems and on the kind of crop to be grown.

CAPABILITY UNIT IIIw-9

This unit consists of poorly drained organic soils and of soils underlain by organic matter. The soils are on flats or in depressions on the broad bottoms of stream valleys. They are subject to flooding and have slow surface runoff and internal drainage. The following soils are in this unit:

Peat and Muck, deep.
Wallkill silt loam.

Peat and Muck, deep, consists of organic materials to a depth greater than 42 inches. The Wallkill soil is made up of 18 to 42 inches of silty material deposited over peat by water.

These soils are easy to work. If they are adequately drained and are managed properly otherwise, they are potentially high in productivity. With proper drainage and good management, the soils are well suited to special crops and row crops can be grown year after year. They are also well suited to pasture or can be used as habitats for wildlife.

Some areas of these soils have been drained and are used for crops. More than half of the acreage, however, is still covered by sedges, grasses, brush, and sparse stands of tamarack, and these areas are used for pasture and wildlife. Most areas that have been drained are used intensively to grow row crops or special crops.

If these soils are cropped, they need deep ditches or tile to improve the drainage. In many places surface ditches or diversion ditches on adjacent land that contributes overflow water are used to complement the deep drainage system. After the areas of Peat and Muck, deep, have been drained, they require protection from wind erosion and fire.

The soils in this unit need fairly large applications of potash and a nitrogen fertilizer as a starter. They generally do not need lime, because they are nearly neutral.

CAPABILITY UNIT IIIw-14

This unit consists of deep, moderately well drained to somewhat poorly drained soils that are subject to flooding. The soils are on bottom lands along streams. They are predominantly silty, but small areas covered by coarser textured overwash materials are included. The following soils are in this unit:

Loamy alluvial land.
Orion silt loam.

If these soils are adequately drained and are protected from overflow, they are easy to work. A large part of the acreage is adjacent to streams, and flooding is difficult to control. In these areas the soils are used mainly for permanent pasture. In areas where crops are not damaged by flooding, corn, soybeans, small grains, grasses, red clover, and ladino clover are grown. A small acreage is wooded.

If these soils are to be cropped, most of the areas will require drainage or protection from floodwaters. Dikes or diversion ditches may be needed to control flooding, and surface ditches are helpful on the nearly level areas. Practices to control erosion on adjoining, higher lying areas will reduce flooding and will keep overwash sediments from being deposited on these soils.

Suggested cropping systems for these soils are—

1 year each of a row crop, small grain, and hay.
2 years of row crops followed by 1 year each of a small grain and hay.

Pastures on these soils need lime and fertilizer and should be reseeded. They also need protection from overgrazing.

If these soils are adequately drained and are protected from overflow, crops grown on them respond well to fertilizer. Lime may also be needed if legumes are to be grown.

CAPABILITY UNIT IVe-1

This unit consists of deep, well-drained, moderately permeable, silty soils on uplands and on terraces along streams. The soils that have slopes of 6 to 12 percent are severely eroded, and those that have slopes of 12 to 20 percent are slightly to moderately eroded. The soils can be kept in good tilth if adequate practices are used to protect them from erosion and if a good supply of organic matter is maintained. The soils are moderate to moderately high in moisture-supplying capacity. The following soils are in this unit:

Downs silt loam, benches, 12 to 20 percent slopes, moderately eroded.
Dubuque soils, deep, 6 to 12 percent slopes, severely eroded.
Dubuque silt loam, deep, 12 to 20 percent slopes.
Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded.
Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded.
Fayette silt loam, uplands, 12 to 20 percent slopes.
Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded.
Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded.
Fayette silt loam, valleys, 12 to 20 percent slopes.
Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded.
Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded.
Norden silt loam, 12 to 20 percent slopes.
Norden silt loam, 12 to 20 percent slopes, moderately eroded.

Some areas of these soils are used for crops or pasture, and others are in trees. The principal crops are small grains and hay. A fairly large acreage that consists mainly of areas that are not readily accessible for farming are utilized for permanent pasture and woodlots.

The soils in this unit are too steep or severely eroded to be cropped intensively. Nevertheless, if adequate measures are used to control erosion and if other good management practices are used, row crops can be grown on them safely. Careful management is required, however, to maintain a good supply of plant nutrients and organic matter in the soils. Good returns can be realized by growing a small grain and hay crop in rotation or by reno-

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vating and seeding the pastures. In addition to the other practices described, the farm operator may need to use diversion ditches to protect the soils from erosion, especially on the long slopes.

Suggested practices and cropping systems are—

Contour stripcropping: 1 year each of a row crop and small grain followed by 4 years of hay.
Contour stripcropping with wheel-track planting: 1 year each of a row crop and small grain followed by 3 years of hay.

If no practices are used to protect the soils, the cropping system should consist only of small grains and hay.

Crops grown on these soils respond well if fertilizer is added. Because legumes are the dominant crops, adequate lime is essential. Most of the areas will require lime.

CAPABILITY UNIT IVe-2

This unit consists of moderately deep, well-drained, loamy and silty soils that are underlain by limestone or sandstone at a depth of about 2 to 3 feet. The soils are moderately permeable. The ones that have slopes of 6 to 12 percent are severely eroded, and those that have slopes of 12 to 20 percent are slightly to moderately eroded. Good tilth can be maintained only by managing the soils carefully. Because the soils are limited in depth and have steep slopes, their moisture-supplying capacity is moderately low. The following soils are in this unit:

Dubuque soils, 6 to 12 percent slopes, severely eroded.
Dubuque silt loam, 12 to 20 percent slopes.
Dubuque silt loam, 12 to 20 percent slopes, moderately eroded.
Gale silt loam, 6 to 12 percent slopes, severely eroded.
Gale silt loam, 12 to 20 percent slopes.
Gale silt loam, 12 to 20 percent slopes, moderately eroded.
Hesch loam, 12 to 20 percent slopes, moderately eroded.
Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded.
Hixton loam, 6 to 12 percent slopes, severely eroded.
Hixton loam, 12 to 20 percent slopes.
Hixton loam, 12 to 20 percent slopes, moderately eroded.
Norden loam, 12 to 20 percent slopes, moderately eroded.
Norden fine sandy loam, 12 to 20 percent slopes.
Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded.

Some areas of these soils are used for crops, but much of the acreage is unfavorable for tillage and is in permanent pasture or trees. Some areas are not readily accessible for farming. If they are used for crops, the cropping system consists mainly of small grains and hay. The soils are well suited to trees and to use as wildlife areas.

If these soils are to be used for crops, special care must be taken to prevent damage from erosion. Besides the practices described, the farm operator may need to use diversion ditches to protect the soils Because of the moderate depth of the soils, the loss of additional soil material through erosion would reduce the thickness of the root zone, and would permanently reduce the capacity of the soils to make good yields. Adding barnyard manure and plowing under green-manure crops and crop residues are especially helpful in improving the moisture-supplying capacity.

Even though occasional row crops can be grown safely on these soils, a cropping system that consists entirely of small grains and hay crops gives good returns with less risk of damage to the soils. A good supply of plant nutrients should be maintained in these soils.

Suggested practices and cropping systems are—

Contour stripcropping: 1 year of a small grain followed by 3 years of hay.
Contour stripcropping with wheel-track planting: 1 year each of a row crop and small grain followed by 4 years of hay.

If no practices are used to protect the soils, the cropping system should consist of small grains and hay.

Crops grown on these soils respond moderately well if fertilizer and lime are added. For best yields, legumes will require adequate applications of lime.

CAPABILITY UNIT IVe-7

This unit consists of shallow to moderately deep, well-drained to somewhat excessively drained soils that are underlain by loose sand or sandstone. The soils are droughty and are subject to severe erosion. They need practices to conserve moisture, including practices to control weeds. Using contour stripcropping and establishing terraces and grassed waterways will help to control erosion. In some areas diversion ditches may be needed on the upper parts of slopes to divert runoff water so that it will not concentrate and run onto these soils. The following soils are in this unit:

Burkhardt sandy loam, 6 to 12 percent slopes, moderately eroded.
Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded.
Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded.
Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded.

All of these soils have a sandy surface layer. Therefore, adding organic matter frequently will help to control erosion and will improve their moisture-holding capacity. These soils are suited to corn, soybeans, small grains, and hay. They are also suitable for trees and as wildlife areas.

Suggested practices and cropping systems are—

Contour stripcropping: 1 year each of a row crop and small grain followed by 3 years of hay.

If no practices are used to protect the soils, the cropping system should consist of small grains and hay.

CAPABILITY UNIT IVs-3

This unit consists dominantly of excessively drained or somewhat excessively drained, sandy soils underlain by loose sand or by sandstone. In some of the areas there are layers of finer textured material in the underlying sands. The soils are on uplands and on terraces along streams. These soils dry out rapidly. If they are not protected, they are highly susceptible to wind erosion (fig. 10). The sloping areas are also subject to erosion by water; they are highly susceptible to gullying if they are not protected from runoff from adjacent areas. Once gullies form, they enlarge rapidly and are extremely difficult to control.

The supply of plant nutrients is naturally low in these soils. The soils are also low in moisture-supplying capacity, especially during periods of low rainfall or when rainfall is poorly distributed. Lack of coherence of the soil particles and lack of stability in the surface layer make many of the areas difficult to till. The following soils are in this unit:

Boone fine sand, 2 to 6 percent slopes, eroded.
Gotham loamy fine sand, 0 to 2 percent slopes.
Gotham loamy fine sand, 2 to 6 percent slopes.

Figure 10.—**Soils of capability unit IVs–3 on a terrace bench. Snow has been trapped by the shelterbelt, which not only helps to conserve moisture but protects the soils from wind erosion.**

Gotham loamy fine sand, 2 to 6 percent slopes, eroded.
Hubbard soils, 2 to 6 percent slopes.
Plainfield loamy fine sand, 0 to 2 percent slopes.
Plainfield loamy fine sand, 2 to 6 percent slopes.
Plainfield loamy fine sand, 2 to 6 percent slopes, eroded.
Plainfield loamy fine sand, loamy substrata variant.
Sparta loamy fine sand, 0 to 2 percent slopes.
Sparta loamy fine sand, 2 to 6 percent slopes.
Sparta loamy fine sand, 2 to 6 percent slopes, eroded.
Sparta loamy fine sand, loamy substrata variant.
Trempe loamy fine sand, 0 to 2 percent slopes.
Trempe loamy fine sand, 2 to 6 percent slopes.
Trempe loamy fine sand, 2 to 6 percent slopes, eroded.

These soils are used extensively for crops, chiefly soybeans, corn, rye, oats, clover, and alfalfa. In addition, grasses are included in some of the hay crops. The soils are not used extensively for permanent pasture. Because the soils are droughty, a large acreage is planted to pine trees. Only a small acreage is used for woodlots made up of hardwoods. Some areas, once used for crops, have been abandoned and are idle. The soils are better suited to use as permanent pastures, woodlots, or wildlife areas than to tilled crops.

If the soils are used for crops, shelterbelts should be established and wind stripcropping practiced to control wind erosion. The use of shelterbelts and wind stripcropping gives protection from the warm, drying winds in summer. In sloping areas contour stripcropping will help to control erosion by wind and water.

Adding barnyard manure and turning under green-manure crops and crop residues are particularly valuable practices. Besides protecting the soils from wind, they supply plant nutrients and improve the moisture-supplying capacity. Commercial fertilizer is essential to keep a supply of plant nutrients in the soils. The soils also need to be protected from runoff from adjacent areas.

Suggested practices and cropping systems are:

Contour stripcropping or wind stripcropping: 1 year each of a row crop and small grain followed by 2 years of hay.

If crop residues are turned under, if practices are used to control erosion, and if the seedbed is prepared with a field cultivator or similar tillage implement other than a plow, the following cropping system is suitable:

1 year each of a row crop, small grain, and hay.

If no practices are used to protect the soils, the best cropping system to use is one that consists of small grains and hay. Idle or low-producing areas should be planted to pine trees.

Crops grown on these soils need lime as well as fertilizer. A fertilizer that contains a high proportion of potassium and some boron is especially needed for legume-grass hay. Legumes will require regular applications of lime. Pastures on these soils need careful management to prevent damage from overgrazing.

CAPABILITY UNIT IVw–14

Only one soil, Sandy alluvial land, is in this capability unit. This soil formed in coarse-textured sediments deposited by streams, and its texture varies greatly within short distances. Where flooding is not too severe, or where very sandy or gravelly overwash material is not deposited frequently, the areas can be cropped. Other areas should be pastured, or kept in trees or wildlife areas.

A suitable cropping system is—

1 year each of a row crop and small grain and 2 years of hay.

Some areas of this soil need dikes, diversion ditches, surface ditches, and grassed waterways to control flooding and to remove excess water. Because of the sandy texture of the soil, crops on some of the better drained areas may be damaged by lack of moisture during extended dry periods.

CAPABILITY UNIT Vw–15

This unit consists of poorly drained, nearly level, mixed sandy and loamy soils that are subject to frequent flooding. The soils are on bottoms adjacent to streams. They have a high water table. The following soils are in this unit:

Duelm fine sandy loam, high water table.
Loamy alluvial land, poorly drained.
Peat and Muck, shallow.
Sandy alluvial land, poorly drained.

Nearly all of the acreage of these soils is in trees, permanent pasture, or wildlife areas. Only a small acreage is used to grow cultivated crops.

Because of the frequent flooding and high water table, and because of the unfavorable texture of the subsoil, these soils cannot feasibly be improved for crops. They are better used for permanent pasture, trees, or wildlife areas. Some areas that are pastured can be protected from overflow and improved by reseeding or adding fertilizer to the bluegrass.

Areas that are in trees require protection from fire and grazing. Replanting desirable trees is somewhat restricted. Therefore, desirable kinds of trees need to be encouraged by using good woodland management.

The soils in this unit are suitable for development of wildlife areas. Plantings that will provide food and cover will encourage wildlife. In many areas dikes can be used to control the level of the water and thus create favorable sites for waterfowl and fur-bearing animals. Marshy areas, where grasses and sedges grow, require protection from fire.

CAPABILITY UNIT VIe–1

This unit consists of silt loams, loams, and fine sandy loams that are underlain by sand, sandstone, or limestone. The soils that have slopes of 12 to 20 percent are slightly to severely eroded. The ones that have slopes of 20 to 30 percent range from shallow to deep and are slightly to moderately eroded. The moisture-holding capacity of the shallow soils is low, but it is moderate in the deeper soils. The severe erosion and steepness of the slopes limit the kind of tillage that can be used on these soils. The following soils are in this unit:

Dubuque silt loam, 20 to 30 percent slopes.
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded.
Dubuque soils, 12 to 20 percent slopes, severely eroded.
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded.
Dubuque silt loam, deep, 20 to 30 percent slopes.
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately and severely eroded.
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded.
Fayette silt loam, uplands, 20 to 30 percent slopes.
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded.
Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded.
Fayette silt loam, valleys, 20 to 30 percent slopes.
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded.
Gale silt loam, 12 to 20 percent slopes, severely eroded.
Gale silt loam, 20 to 30 percent slopes.
Gale silt loam, 20 to 30 percent slopes, moderately eroded.
Hesch loam, 20 to 30 percent slopes.
Hesch loam, 20 to 30 percent slopes, moderately eroded.
Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded.
Hixton loam, 12 to 20 percent slopes, severely eroded.
Hixton loam and fine sandy loam, 20 to 30 percent slopes.
Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded.
Hixton fine sandy loam, 12 to 20 percent slopes.
Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded.
Lindstrom silt loam, 20 to 30 percent slopes.
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded.
Norden loam, 20 to 30 percent slopes, moderately eroded
Norden silt loam, 12 to 20 percent slopes, severely eroded.
Norden silt loam, 20 to 30 percent slopes.
Norden silt loam, 20 to 30 percent slopes, moderately eroded.
Norden fine sandy loam, 12 to 20 percent slopes, severely eroded.
Urne-Norden loams, 20 to 30 percent slopes.
Urne-Norden loams, 20 to 30 percent slopes, moderately eroded.

Some areas of these soils are used for pasture or hay crops, and others, for trees or as wildlife areas. The soils are used to grow a large part of the pasture crops and forage crops produced in the county. They are too steep and susceptible to erosion to be used for row crops. If adequate lime and fertilizer are applied, good yields of legume-grass mixtures and similar crops are obtained. To protect the soils from erosion, areas without sufficient plant cover should be renovated and seeded. Renovation permits tillage without causing serious losses from erosion, and it limits the risk of gullies forming. It also leaves the surface soil in condition to absorb and hold large amounts of runoff water.

Many areas of these soils are in trees. If proper management is used, good returns can be realized from the woodlots. These areas need protection from livestock and fire. The damage caused by grazing them greatly offsets the value of the small amounts of forage obtained. The woodlands contain sparse, low-quality forage, and some of the plants are harmful to livestock. The animals trample and damage the young trees. They also damage the leaf litter that absorbs and stores rainfall. In addition, runoff concentrates on the trails left by livestock and often causes gullies to form. After gullies have formed, they are difficult to control and are likely to advance quickly into adjacent cropland.

If more pasture is needed, brush and trees should be removed and the areas renovated. By doing this, higher returns will be realized than if an attempt is made to use the same area for both woodland and pasture.

If these soils are to be planted to trees or left in trees, manage the areas according to suggestions given in the section "Woodland." A local agricultural technician or forester will also be glad to give suggestions. Good management is necessary for high returns from farm woodlots. If the woodlots are well managed, runoff is reduced and lower lying fields will be less damaged by erosion. Flooding in the valleys of streams will also be reduced.

CAPABILITY UNIT VIs-3

This unit consists of sandy, excessively drained, sloping soils that are underlain by loose sand or sandstone. The soils are on uplands and on terraces along streams. They are droughty, and, if not protected, are highly susceptible to erosion by wind and water. The areas that are adjacent to terrace escarpments are also susceptible to severe gullying. These soils are naturally low in plant nutrients and are low in moisture-supplying capacity. Many of the areas are difficult to till because soil particles in the surface layer lack coherence and stability.

The following soils are in this unit:

Boone fine sand, 6 to 12 percent slopes, eroded.
Plainfield loamy fine sand, 6 to 12 percent slopes, eroded.
Sparta loamy fine sand, 6 to 12 percent slopes.
Sparta loamy fine sand, 6 to 12 percent slopes, eroded.
Trempe loamy fine sand, 6 to 12 percent slopes, eroded.

Some areas of these soils are used for crops, and others are in trees or in permanent pasture. Because yields are low, some areas have been abandoned for crops and are idle. Droughtiness and susceptibility to erosion make the soils unsuitable for row crops. If good management is used and rainfall is well distributed throughout the growing season, hay crops and pasture make moderate yields.

As a result of the general low productivity of these soils, many areas are being planted to pine trees. The soils are not well suited to hardwoods. For the best yields of timber, areas now in hardwoods should be replanted to pines. Other areas should be used for wildlife and as watersheds.

If these soils are used for pasture or hay, lime and fertilizer should be added in the kinds and amounts indicated by soil tests. Turning crop residues under and preparing the seedbed without plowing it will help to control erosion, will increase the supply of plant nutrients, and will improve the moisture-supplying capacity of the soils. A field cultivator or similar implement can be used for preparing the seedbed. Barnyard manure should also be added frequently.

CAPABILITY UNIT VIIe-1

This unit consists of shallow to deep, steep to very steep soils that are severely eroded or stony. The steep slopes of these soils restrict their use. The soils are subject to severe erosion unless they are kept under a cover of trees or grass. The moisture-supplying capacity ranges from low to moderate. The following soils are in this unit:

Dubuque silt loam, 30 to 40 percent slopes, eroded.
Dubuque soils, 20 to 30 percent slopes, severely eroded.

Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded.
Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded.
Gale silt loam, 20 to 30 percent slopes, severely eroded.
Gullied land.
Hesch fine sandy loam, 20 to 30 percent slopes.
Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded.
Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded.
Hixton loam and fine sandy loam, 30 to 40 percent slopes.
Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded.
Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded.
Norden silt loam, 20 to 30 percent slopes, severely eroded.
Terrace escarpments, loamy.
Urne-Norden loams, 30 to 40 percent slopes.
Urne-Norden loams, 30 to 40 percent slopes, moderately eroded.

Some areas of these soils are wooded or in pasture. Others are used for wildlife. Most of the areas are too steep to be cultivated, but some of those less sloping can be renovated for pasture. The severely eroded areas have been cleared, plowed, and then often left idle when severely washed because of low production of crops. These areas present severe revegetation problems. If the soils are pastured, they must be managed carefully to prevent damage by erosion. Areas that are overgrazed are highly susceptible to gully erosion.

Wooded areas occupy a large acreage. If the woodlots are properly managed, they will give good returns. The soils in well-managed woodlots absorb water from runoff and help to prevent erosion in lower lying areas. Also, well-managed woodlots support a large population of wildlife.

CAPABILITY UNIT VIIs–6

This unit consists of sandy soils and of steep, shallow soils severely limited by droughtiness or stoniness. Some of them are sandy and sloping, and others are shallow and very steep. All of the soils are low in moisture-supplying capacity. The following soils are in this unit:

Boone fine sand, 12 to 40 percent slopes, eroded.
Sparta and Plainfield fine sands and Dune land.
Steep stony and rocky land.
Terrace escarpments, sandy.

Most areas of these soils support trees or a sparse cover of grass. Because of erosion caused by wind, some of the areas are bare.

To prevent blowing or erosion by water, these soils must be kept in grass or a cover of trees. If they are managed properly, hardwoods on some areas of Steep stony and rocky land produce fair yields of wood products. Because the soils are so droughty, however, they are better suited to pines than to hardwoods. Besides furnishing merchantable products, plantations of pines prevent blowing and conserve moisture by absorbing runoff.

CAPABILITY UNIT VIIIs–1

This unit consists only of Riverwash, which is made up of loose sand and gravel recently deposited by streams. In most places Riverwash occurs as sandbars in streams or lies along the shoreline of streams. Because new sediments are deposited rapidly, and because the soil materials are droughty and lack plant nutrients, little or no useful vegetation grows on this land. Riverwash is used only as wildlife areas or for recreation.

CAPABILITY UNIT VIIIw–1

This capability unit consists of only one soil, Marsh, which is made up of stream sediments that are perennially wet. Large areas of this soil occur along the Mississippi and Chippewa Rivers. Many of the areas are covered by water during much of the year. The vegetation consists mainly of rushes, sedges, cattails, and other plants that tolerate water, but there are a few trees that tolerate water.

This soil is not suitable for pasture or trees, but it is well suited to wildlife and to use as recreational areas. Many of the areas can be improved for waterfowl and fur-bearing animals by building dikes or ditches to control the level of the water. In spring and fall, when the vegetation is dry, the areas require protection from fire. They provide hunting, fishing, and trapping facilities for large numbers of people.

Special Soil Management

This section discusses special management practices needed when the soils are irrigated. It also describes special crops grown in the county.

Irrigation

To successfully irrigate the soils in this county, several factors must be considered. Some of these are discussed here.

Check the water supply.—Be sure there is an adequate, dependable supply of water. The source may be a natural lake or stream, a pit, a sand point that taps the water table, a well, or a pond that stores surface runoff. The use of water from natural lakes, streams, and large wells is limited by law. Therefore, before investing time and money in irrigation, be sure you have the legal right to proceed.

Consider the soil.—Before you purchase irrigation equipment, determine whether the soil is suitable. The soils in classes I and II are presently the most desirable for irrigation, and the soils in class IV, the least. All of the soils in subclasses IIIe and IVe have slopes so strong that developing a water supply for irrigation might be too expensive.

In Buffalo County the capability units that have soils potentially responsive to irrigation are grouped as follows: (1) Capability units I–1, IIe–1, IIe–2, IIIe–1, IIIe–2, IVe–1, and IVe–2—deep and moderately deep, well-drained, silty soils of uplands that have adequate moisture-storing capacity in most years; (2) capability units IIs–1, IIIs–2, and IVs–3—soils that are limited in moisture-storing capacity because they are sandy or overlie sand.

The soils in capability unit IIs–1 and those in capability unit IIIs–2 that have slopes of less than 6 percent are probably the most desirable for irrigation. The soils of capability unit IVs–3 are generally nearly level and are suited to irrigation. They have, however, a few steeper areas that are not so well suited. In addition, they have a very sandy texture. Consequently, the soils of this capability unit need to have water and fertilizer applied with more careful timing than is necessary for the other soils discussed in this section, and for that reason are not listed among the soils that offer the best potential for irrigation.

Give the soils extra care.—Irrigated soils, and especially sandy soils, need large amounts of fertilizer, which must be applied carefully. They must be well managed otherwise. The crops irrigated the most successfully are generally those that give a high return per acre, for example, shallow-rooted truck crops, potatoes, and small fruits.

Get expert advice.—The services of a competent agricultural engineer are needed to help in deciding whether or not to invest in an irrigation system. Technical help that will help you make your decision can be obtained from the county agent or from technicians of the Soil Conservation Service who assist the Buffalo County Soil Conservation District.

Special crops

The special crops in this county are mainly horseradish and peas and corn for canning. The acreage in horseradish increased only recently when, in 1956, a part of a large peat marsh just west of Mondovi was drained and planted to that crop. At the present time, approximately 250 acres is used to grow horseradish.

The acreage used to grow peas and corn for canning is less extensive. A total of 137 acres of green peas and 32 acres of sweet corn was grown in the county in 1954.

Estimated Yields

Table 3 gives estimated average yields per acre for the crops commonly grown in the county. The estimates were based on interviews with farmers, on results obtained by the agricultural experiment station on experimental test plots, and on observations made by soil surveyors and other agricultural workers who are familiar with the soils.

TABLE 3.—*Estimated average acre yields of the principal crops*

[Absence of yield indicates soil is not suitable for the crop or that the crop ordinarily is not grown]

Soil	Capability unit	Corn		Oats		Alfalfa-bromegrass hay		Pasture	
		Average	High	Average	High	Average	High	Average	High
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Arenzville silt loam	IIw-11	65	105	50	62	2. 8	3. 5	110	145
Bertrand silt loam, 2 to 6 percent slopes	IIe-1	65	105	55	70	2. 8	4. 0	85	125
Bertrand silt loam, 0 to 2 percent slopes	I-1	65	105	55	70	3. 0	4. 0	95	130
Bertrand silt loam, 2 to 6 percent slopes, moderately eroded	IIe-1	63	105	52	68	2. 8	4. 0	85	125
Bertrand silt loam, 6 to 12 percent slopes	IIIe-1	60	100	48	60	2. 6	3. 5	80	125
Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-1	58	97	45	55	2. 6	3. 5	80	125
Boone fine sand, 2 to 6 percent slopes, eroded	IVs-3	28	40	20		1. 0	1. 6	25	60
Boone fine sand, 6 to 12 percent slopes, eroded	VIs-3							20	40
Boone fine sand, 12 to 40 percent slopes, eroded	VIIs-6							20	35
Burkhardt sandy loam, 2 to 6 percent slopes	IIIs-2	40	60	35	45	1. 5	2. 2	60	90
Burkhardt sandy loam, 0 to 2 percent slopes	IIIs-2	40	60	35	45	1. 7	2. 4	60	90
Burkhardt sandy loam, 6 to 12 percent slopes, moderately eroded	IVe-7	35	50	32	40	1. 2	2. 0	50	85
Chaseburg silt loam, 0 to 2 percent slopes	IIw-11	70	105	55	65	3. 0	4. 0	110	145
Chaseburg silt loam, 2 to 6 percent slopes	IIw-11	68	100	55	65	3. 0	3. 5	105	140
Chaseburg silt loam, 6 to 12 percent slopes	IIIe-1	65	98	50	60	2. 8	3. 5	95	135
Curran silt loam [2]	IIw-2	50	75	45	55	2. 0	3. 0	90	130
Dakota loam, 0 to 2 percent slopes	IIs-1	60	85	45	55	2. 5	3. 2	85	120
Dakota loam, 2 to 6 percent slopes	IIe-2	60	80	45	55	2. 5	3. 2	85	120
Dakota fine sandy loam, 0 to 2 percent slopes	IIIs-2	50	73	40	50	2. 2	3. 0	80	115
Dakota fine sandy loam, 2 to 6 percent slopes	IIIs-2	50	70	40	50	2. 2	3. 0	80	115
Dakota fine sandy loam, 2 to 6 percent slopes, moderately eroded	IIIs-2	45	68	38	45	2. 0	2. 8	75	110
Downs silt loam, 2 to 6 percent slopes	IIe-1	65	110	55	70	3. 0	4. 0	100	140
Downs silt loam, 2 to 6 percent slopes, moderately eroded	IIe-1	63	108	50	70	2. 8	4. 0	100	140
Downs silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-1	60	100	48	65	2. 7	3. 5	90	135
Downs silt loam, benches, 2 to 6 percent slopes	IIe-1	65	110	55	70	3. 0	4. 0	100	140
Downs silt loam, benches, 6 to 12 percent slopes, moderately eroded	IIIe-1	60	100	48	65	2. 7	3. 5	90	135
Downs silt loam, benches, 12 to 20 percent slopes, moderately eroded	IVe-1	50	75	40	52	2. 5	3. 0	80	130
Dubuque silt loam, 2 to 6 percent slopes	IIe-2	50	72	45	58	2. 4	3. 0	80	120
Dubuque silt loam, 2 to 6 percent slopes, moderately eroded	IIe-2	45	70	40	55	2. 2	3. 0	80	120
Dubuque silt loam, 6 to 12 percent slopes	IIIe-2	45	68	40	55	2. 2	2. 8	78	115
Dubuque silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	40	65	38	53	2. 0	2. 8	70	110
Dubuque silt loam, 12 to 20 percent slopes	IVe-2	38	63	38	45	2. 0	2. 6	65	100
Dubuque silt loam, 12 to 20 percent slopes, moderately eroded	IVe-2	38	58	35	45	1. 8	2. 5	60	100
Dubuque silt loam, 20 to 30 percent slopes	VIe-1			25	45	1. 8	2. 5	60	90
Dubuque silt loam, 20 to 30 percent slopes, moderately eroded	VIe-1			32	42	1. 7	2. 3	55	85
Dubuque silt loam, 30 to 40 percent slopes, eroded	VIIe-1							55	
Dubuque soils, 6 to 12 percent slopes, severely eroded	IVe-2	35	58	35	45	1. 8	2. 5	60	95
Dubuque soils, 12 to 20 percent slopes, severely eroded	VIe-1			30	40	1. 7	2. 3	55	85
Dubuque soils, 20 to 30 percent slopes, severely eroded	VIIe-1			25	38	1. 5	2. 0	50	80

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of the principal crops*—Continued

Soil	Capability unit	Corn		Oats		Alfalfa-bromegrass hay		Pasture	
		Average	High	Average	High	Average	High	Average	High
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded	IIIe-1	55	80	45	53	2.4	3.5	80	125
Dubuque silt loam, deep, 2 to 6 percent slopes	IIe-1	60	90	50	60	2.8	4.0	90	135
Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded	IIe-1	55	88	50	60	2.5	4.0	85	130
Dubuque silt loam, deep, 6 to 12 percent slopes	IIIe-1	58	85	45	55	2.5	3.5	85	130
Dubuque soils, deep, 6 to 12 percent slopes, severely eroded	IVe-1	48	73	38	48	2.2	3.0	75	120
Dubuque silt loam, deep, 12 to 20 percent slopes	IVe-1	50	80	40	50	2.4	3.2	80	125
Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded	IVe-1	45	74	38	48	2.2	3.0	75	115
Dubuque soils, deep, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	35	43	2.0	2.8	70	110
Dubuque silt loam, deep, 20 to 30 percent slopes	VIe-1	------	------	38	46	2.3	3.0	75	115
Dubuque silt loam, deep, 20 to 30 percent slopes, moderately and severely eroded	VIe-1	------	------	35	45	2.0	2.7	70	110
Duelm fine sandy loam [2]	IIIw-5	50	70	40	50	2.0	3.0	90	130
Duelm fine sandy loam, high water table	Vw-15	------	------	------	------	------	------	60	90
Ettrick silt loam [2]	IIw-1	------	110	------	50	------	3.5	80	145
Ettrick silt loam, sandy substratum [2]	IIIw-5	------	100	------	60	------	3.5	80	145
Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded	IIIe-1	55	100	45	63	2.6	3.8	85	130
Fayette silt loam, uplands, 2 to 6 percent slopes	IIe-1	65	100	55	70	3.0	4.0	95	140
Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded	IIe-1	55	100	50	70	2.8	4.0	90	135
Fayette silt loam, uplands, 6 to 12 percent slopes	IIIe-1	55	100	50	65	3.0	3.8	90	135
Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded	IVe-1	50	85	40	50	2.4	3.0	75	120
Fayette silt loam, uplands, 12 to 20 percent slopes	IVe-1	52	83	40	50	2.6	3.3	85	130
Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded	IVe-1	45	80	40	50	2.4	3.0	75	120
Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	38	45	2.2	2.8	70	110
Fayette silt loam, uplands, 20 to 30 percent slopes	VIe-1	------	------	38	48	2.2	2.8	70	110
Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	35	45	2.0	2.6	70	110
Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded	VIIe-1	------	------	------	------	1.6	2.2	65	105
Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	38	45	2.0	2.8	70	115
Fayette silt loam, valleys, 2 to 6 percent slopes	IIe-1	65	100	50	70	3.2	3.6	105	145
Fayette silt loam, valleys, 6 to 12 percent slopes	IIIe-1	60	100	50	65	3.0	3.4	100	140
Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	IIIe-1	55	100	50	60	2.8	3.4	90	135
Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded	IVe-1	50	85	40	52	2.4	3.0	75	130
Fayette silt loam, valleys, 12 to 20 percent slopes	IVe-1	53	82	40	50	3.0	3.4	90	135
Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	IVe-1	------	------	40	50	2.6	3.2	85	130
Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	38	45	2.2	3.0	75	125
Fayette silt loam, valleys, 20 to 30 percent slopes	VIe-1	------	------	38	48	2.2	3.0	75	125
Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded	VIIe-1	------	------	------	------	------	------	65	105
Gale silt loam, 12 to 20 percent slopes, moderately eroded	IVe-2	40	60	35	43	1.8	2.2	65	100
Gale silt loam, 2 to 6 percent slopes, moderately eroded	IIe-2	55	80	45	58	2.4	3.5	75	125
Gale silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	52	75	45	55	3.2	3.3	70	110
Gale silt loam, 6 to 12 percent slopes, severely eroded	IVe-2	40	60	35	42	1.8	2.8	65	100
Gale silt loam, 12 to 20 percent slopes	IVe-2	45	65	40	45	2.2	2.8	70	110
Gale silt loam, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	30	38	1.6	2.0	55	95
Gale silt loam, 20 to 30 percent slopes	VIe-1	------	------	32	40	1.6	2.2	65	100
Gale silt loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	32	40	1.5	2.1	60	90
Gale silt loam, 20 to 30 percent slopes, severely eroded	VIIe-1	------	------	------	------	1.3	1.8	50	75
Gotham loamy fine sand, 2 to 6 percent slopes	IVs-3	38	55	32	40	1.3	2.0	50	85
Gotham loamy fine sand, 2 to 6 percent slopes, eroded	IVs-3	35	50	30	40	1.2	2.0	45	80
Gotham loamy fine sand, 0 to 2 percent slopes	IVs-3	40	58	35	45	1.5	2.1	50	85
Granby sandy loam [2]	IIIw-5	45	70	38	55	------	2.7	80	140
Granby fine sandy loam, stratified substratum variant [2]	IIIw-5	45	70	40	50	2.0	3.0	90	115
Gullied land	VIIe-1	------	------	------	------	------	------	------	------
Hesch loam, 12 to 20 percent slopes, moderately eroded	IVe-2	45	65	40	48	1.7	2.2	60	95

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of the principal crops*—Continued

Soil	Capability unit	Corn		Oats		Alfalfa-bromegrass hay		Pasture	
		Average	High	Average	High	Average	High	Average	High
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Hesch loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	50	80	45	55	1.8	2.6	70	100
Hesch loam, 20 to 30 percent slopes	VIe-1	------	------	38	45	1.6	2.1	60	90
Hesch loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	32	40	1.5	2.0	55	85
Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded	VIe-1	------	------	35	40	1.5	2.0	55	85
Hesch fine sandy loam, 2 to 6 percent slopes	IIIs-2	48	75	40	50	1.8	2.5	70	110
Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded	IVe-7	45	70	38	48	1.6	2.5	65	100
Hesch fine sandy loam, 20 to 30 percent slopes	VIIe-1	------	------	30	38	1.5	2.0	55	75
Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded	VIIe-1	------	------	30	38	1.3	1.8	45	75
Hixton loam, 12 to 20 percent slopes, moderately eroded	IVe-2	38	58	33	43	1.5	2.1	60	90
Hixton loam, 2 to 6 percent slopes	IIe-2	55	78	43	50	2.3	3.0	70	120
Hixton loam, 2 to 6 percent slopes, moderately eroded	IIe-2	50	75	40	50	2.1	2.9	70	120
Hixton loam, 6 to 12 percent slopes	IIIe-2	52	73	45	53	2.2	2.8	65	110
Hixton loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	50	70	42	50	1.8	2.1	65	100
Hixton loam, 6 to 12 percent slopes, severely eroded	IVe-2	40	60	35	42	1.6	2.3	60	90
Hixton loam, 12 to 20 percent slopes	IVe-2	45	63	38	45	1.6	2.3	65	95
Hixton loam, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	30	37	1.4	2.0	55	85
Hixton loam and fine sandy loam, 20 to 30 percent slopes	VIe-1	------	------	------	------	1.4	2.0	45	75
Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	------	------	1.3	1.7	40	65
Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded	VIIe-1	------	------	------	------	------	------	35	60
Hixton loam and fine sandy loam, 30 to 40 percent slopes	VIIe-1	------	------	------	------	------	------	35	60
Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded	VIIe-1	------	------	------	------	------	------	------	------
Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded	VIe-1	------	------	30	40	1.0	1.8	45	80
Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded	IIIs-2	45	70	38	47	1.8	2.4	65	100
Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded	IVe-7	40	65	55	45	1.6	2.2	60	90
Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded	IVe-2	32	55	30	40	1.3	2.0	45	80
Hixton fine sandy loam, 12 to 20 percent slopes	VIe-1	------	------	32	40	1.2	2.0	55	85
Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded	VIIe-1	------	------	------	------	------	1.5	40	65
Hubbard soils, 0 to 2 percent slopes	IIIs-2	42	58	38	45	1.6	2.2	60	85
Hubbard soils, 2 to 6 percent slopes	IVs-3	38	55	35	40	1.3	1.8	50	80
Huntsville silt loam	IIw-11	65	110	55	65	3.2	3.7	115	150
Jackson silt loam, 0 to 2 percent slopes	I-1	60	110	55	70	3.0	4.0	100	145
Jackson silt loam, 2 to 6 percent slopes	IIe-1	60	105	55	65	3.0	4.0	95	140
Jackson silt loam, 2 to 6 percent slopes, moderately eroded	IIe-1	58	105	50	65	2.8	4.0	95	140
Judson silt loam, 2 to 6 percent slopes	IIw-11	60	105	53	65	3.0	3.5	105	145
Judson silt loam, 0 to 2 percent slopes	IIw-11	65	110	55	65	3.2	3.7	115	150
Judson silt loam, 6 to 12 percent slopes	IIIe-1	58	100	50	60	3.0	3.5	100	140
Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	IVe-1	55	85	40	55	2.6	3.5	90	130
Lindstrom silt loam, 6 to 12 percent slopes	IIIe-1	60	100	50	62	3.0	4.0	95	140
Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-1	58	95	45	62	2.8	4.0	90	135
Lindstrom silt loam, 20 to 30 percent slopes	VIe-1	------	------	40	50	2.5	3.2	85	125
Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	38	45	2.3	3.0	80	120
Loamy alluvial land	IIIw-14	50	70	40	50	1.8	3.0	95	135
Loamy alluvial land, poorly drained	Vw-15	------	------	------	------	------	------	50	80
Marsh	VIIIw-1	------	------	------	------	------	------	------	------
Medary silt loam, 0 to 2 percent slopes	IIw-2	60	85	50	60	2.5	4.0	95	140
Medary silt loam, 2 to 6 percent slopes, moderately eroded	IIe-1	60	80	50	60	2.5	4.0	95	140
Meridian loam, 0 to 2 percent slopes	IIs-1	55	80	45	52	2.3	3.5	70	130
Meridian loam, 2 to 6 percent slopes	IIe-2	55	75	40	50	2.3	3.0	70	125
Meridian loam, 2 to 6 percent slopes, moderately eroded	IIe-2	52	73	40	50	2.1	3.0	65	120
Meridian loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	50	68	40	47	1.8	2.6	60	100
Meridian fine sandy loam, 0 to 2 percent slopes	IIIs-2	45	70	42	45	2.0	2.5	60	100
Meridian fine sandy loam, 2 to 6 percent slopes	IIIs-2	42	68	40	48	1.8	2.4	55	90
Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded	IIIs-2	40	65	38	45	1.6	2.2	50	85

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of the principal crops*—Continued

Soil	Capability unit	Corn		Oats		Alfalfa-bromegrass hay		Pasture	
		Average	High	Average	High	Average	High	Average	High
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded	IVe-7	38	60	32	40	1.5	2.1	45	85
Meridian loam, moderately well drained variant, 0 to 2 percent slopes [2]	IIs-1	60	80	50	60	2.5	3.2	100	145
Meridian loam, moderately well drained variant, 2 to 6 percent slopes	IIe-2	60	80	50	60	2.5	3.2	95	140
Norden loam, 12 to 20 percent slopes, moderately eroded	IVe-2	42	63	38	48	1.8	2.5	70	110
Norden loam, 6 to 12 percent slopes	IIIe-2	55	75	45	55	2.3	3.0	75	120
Norden loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	50	70	42	50	2.1	2.8	75	120
Norden loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	35	45	1.6	2.2	65	100
Norden silt loam, 12 to 20 percent slopes, moderately eroded	IVe-1	43	70	40	50	2.2	2.8	75	120
Norden silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-1	60	85	53	60	2.5	4.0	85	130
Norden silt loam, 12 to 20 percent slopes	IVe-1	45	75	45	55	2.4	3.0	85	130
Norden silt loam, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	35	45	2.0	2.6	70	110
Norden silt loam, 20 to 30 percent slopes	VIe-1	------	------	38	48	1.8	2.4	75	110
Norden silt loam, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	35	43	1.7	2.3	65	100
Norden silt loam, 20 to 30 percent slopes, severely eroded	VIIe-1	------	------	------	------	1.3	2.0	60	80
Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded	IVe-2	40	58	35	43	1.6	2.3	60	90
Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded	IIe-2	50	73	43	50	2.0	2.8	75	115
Norden fine sandy loam, 6 to 12 percent slopes, moderately eroded	IIIe-2	45	68	40	47	1.8	2.5	65	100
Norden fine sandy loam, 12 to 20 percent slopes	IVe-2	42	63	35	43	1.7	2.3	65	100
Norden fine sandy loam, 12 to 20 percent slopes, severely eroded	VIe-1	------	------	30	37	1.4	2.1	55	85
Orion silt loam [2]	IIIw-14	45	95	40	55	------	3.5	95	145
Peat and Muck, deep [2]	IIIw-9	------	115	------	50	------	3.0	60	130
Peat and Muck, shallow	Vw-15	------	------	------	------	------	------	55	130
Plainfield loamy fine sand, 2 to 6 percent slopes	IVs-3	25	35	22	25	1.0	1.5	28	50
Plainfield loamy fine sand, 0 to 2 percent slopes	IVs-3	28	40	25	32	1.0	1.6	30	50
Plainfield loamy fine sand, 2 to 6 percent slopes, eroded	IVs-3	22	32	17	22	.8	1.2	25	45
Plainfield loamy fine sand, 6 to 12 percent slopes, eroded	VIs-3	20	30	15	20	0.8	1.2	20	40
Plainfield loamy fine sand, loamy substrata variant	IVs-3	38	50	30	40	1.2	1.9	45	80
Richwood silt loam, 0 to 2 percent slopes	I-1	65	115	55	65	3.2	3.6	110	145
Richwood silt loam, 2 to 6 percent slopes	IIe-1	60	110	55	65	3.1	3.5	105	140
Richwood silt loam, 6 to 12 percent slopes, moderately eroded	IIIe-1	55	105	50	62	2.8	3.4	90	135
Riverwash	VIIIs-1	------	------	------	------	------	------	------	------
Rowley silt loam [2]	IIw-1	------	115	45	58	------	3.8	95	150
Sandy alluvial land	IVw-14	45	60	30	45	1.7	2.2	85	115
Sandy alluvial land, poorly drained	Vw-15	------	------	------	------	------	------	45	75
Sparta loamy fine sand, 2 to 6 percent slopes	IVs-3	28	42	25	35	1.0	1.6	35	50
Sparta loamy fine sand, 0 to 2 percent slopes	IVs-3	30	45	28	38	1.2	1.8	40	60
Sparta loamy fine sand, 2 to 6 percent slopes, eroded	IVs-3	25	40	22	32	1.0	1.5	30	50
Sparta loamy fine sand, 6 to 12 percent slopes	VIs-3	25	38	20	30	1.0	1.5	30	50
Sparta loamy fine sand, 6 to 12 percent slopes, eroded	VIs-3	22	35	17	25	1.0	1.5	25	45
Sparta loamy fine sand, loamy substrata variant	IVs-3	40	55	35	42	1.5	2.1	50	85
Sparta and Plainfield fine sands and Dune land	VIIs-6	------	------	------	------	------	------	------	------
Steep stony and rocky land	VIIs-6	------	------	------	------	------	------	------	------
Tell silt loam, 2 to 6 percent slopes	IIe-2	50	85	48	55	2.2	3.3	70	120
Tell silt loam, 0 to 2 percent slopes	IIs-1	55	90	50	60	2.4	3.5	75	125
Terrace escarpments, loamy	VIIe-1	------	------	------	------	1.5	2.0	50	85
Terrace escarpments, sandy	VIIs-6	------	------	------	------	------	------	35	55
Toddville silt loam, 0 to 2 percent slopes	I-1	65	115	55	65	3.0	4.0	110	150
Toddville silt loam, 2 to 6 percent slopes	IIe-1	60	110	55	65	3.0	4.0	105	150
Trempe loamy fine sand, 0 to 2 percent slopes	IVs-3	30	45	25	38	1.2	1.8	40	60
Trempe loamy fine sand, 2 to 6 percent slopes	IVs-3	28	40	25	35	1.0	1.6	35	50
Trempe loamy fine sand, 2 to 6 percent slopes, eroded	IVs-3	25	40	22	32	1.0	1.5	30	50
Trempe loamy fine sand, 6 to 12 percent slopes, eroded	VIs-3	22	38	20	30	1.0	1.5	30	50
Urne-Norden loams, 30 to 40 percent slopes	VIIe-1	------	------	------	------	------	------	55	------
Urne-Norden loams, 20 to 30 percent slopes	VIe-1	------	------	35	40	1.8	2.2	70	105
Urne-Norden loams, 20 to 30 percent slopes, moderately eroded	VIe-1	------	------	32	40	1.6	2.0	65	100
Urne-Norden loams, 30 to 40 percent slopes, moderately eroded	VIIe-1	------	------	------	------	------	------	55	------
Wallkill silt loam [2]	IIIw-9	------	100	------	55	------	3.0	65	45
Waukegan silt loam, 0 to 2 percent slopes	IIs-1	65	95	55	70	3.1	3.5	110	140
Waukegan silt loam, 2 to 6 percent slopes	IIe-2	60	90	53	65	3.0	3.5	105	135

[1] Cow-acre-days is the term used to express the carrying capacity of pasture. This value is obtained by multiplying the number of animal units carried per acre by the number of days the pasture is grazed during a single grazing season without injury to the sod.
[2] The soil must be drained before it can be used extensively for agriculture.

Yields in table 3 are given for each soil under two levels of management. In the columns marked "Average" are yields to be expected under the system of management most farmers were practicing at the time the soil survey was made. The management used to obtain the yields in the columns marked "High" is the level that is now being used by only a few farmers in the county.

For corn, average management consists of growing about 12,000 plants of hybrid corn per acre and of applying about 8 tons of manure and 100 pounds of a commercial fertilizer as a starter. The seedbed is prepared and cultivating is done in the usual manner. For seeding oats and alfalfa-bromegrass, average management consists of adding 100 to 200 pounds of a fertilizer high in phosphate and potash. Only a minimum of lime is used, and no special practices are used to prepare the seedbed or to cultivate. Hayfields are cut twice each year and are grazed in fall.

The management used to obtain the yields in the columns marked "High" is better than that used to obtain average yields. For corn, it includes (1) having the soils tested; (2) manuring heavily; (3) fertilizing and adding lime according to the needs indicated by soil tests; (4) growing 18,000 to 20,000 corn plants per acre on the best soils and fewer plants on the less desirable soils; and (5) seeding, spraying, and cultivating at the right time.

For oats, the level of management needed to obtain the yields obtained in the columns marked "High" consists of planting good seed of a variety suited to the soil and of using heavy applications of phosphate and potash. For alfalfa, especially alfalfa grown in long rotations, it includes (1) adding lime according to the needs indicated by soil tests; (2) seeding varieties that are suited to the soil and that are resistant to wilt and to winterkill; (3) cutting at the right time so that three crops can be harvested during an average growing season; (4) allowing little or no grazing in fall; and (5) topdressing each fall with manure or a commercial fertilizer, such as 0–10–30 or 0–10–30 that also contains borax. Supplementary management practices suggested in the section "Management by Capability Units" should also be applied.

Even higher yields of field crops than those shown in table 3 are possible. Many farmers can produce more corn than 100 bushels per acre, but to do so will require that large amounts of fertilizer be applied and careful management used. Consult your county agent or experiment station for specific suggestions about the kinds and amounts of fertilizer, lime, and seeding mixtures to use.

For pasture, the same general management principles apply that apply to field crops. For the yields in the columns marked "Average," farmers reseed their pastures infrequently or not at all and use only minimum amounts of lime and fertilizer. The "High" level of management includes (1) using lime and fertilizer in the kinds and amounts indicated by soil tests; (2) reseeding with suitable grasses and legumes, principally alfalfa-bromegrass and applying fertilizer that is high in nitrogen on soils that cannot be reseeded; (3) preparing the seedbed properly; and (4) stocking and grazing the pastures properly. For additional information about the pastures in the county, refer to the section "Pasture."

Past management influences the fertility of the soils. Misuse of a good soil over a period of years may lower its productivity to the point that the casual observer would conclude that the soil had little value for future cropping. It is possible to restore a soil that is badly run down, however, so that better yields are obtained on it than on another seemingly better soil that has been farmed more carefully. For example, a crop on Bertrand silt loam, 2 to 6 percent slopes, that has been poorly managed may make no better yields than a similar crop on a well-managed field of Gotham loamy fine sand, 0 to 2 percent slopes. If proper management practices are used, however, the yield on the Bertrand soil can easily be raised to a level that cannot be attained on the Gotham soil.

The estimates given in table 3 can be used in many ways. They can be used as a check to see if the present management practices are adequate and to help in determining the kind of management practices that will give the greatest net profit. If the average yields obtained for the past 5 or 10 years are lower than those indicated for the same soils in table 3, then the management and cropping systems should be examined carefully. By applying the practices suggested in the section "Management by Capability Units," it will be possible to obtain better yields.

Woodland

This section discusses the uses of woodland on the farms in Buffalo County. It describes briefly general management of woodland and tells what kinds of trees grow in the county. Finally, it gives estimated potential annual acre yields of woodland products that can be obtained from well-managed stands.

Uses of woodland.—Woodland on farms in Buffalo County occupied 154,358 acres in 1954, or approximately 39 percent of the total acreage in farms. About half of this woodland is pastured. Because of the increased emphasis on improving woodland management, however, there is a trend away from pasturing wooded areas. Most of the trees are on slopes too steep to clear for crops or on stream bottoms that are too wet for cultivation.

The woodlots provide products for sale or for use on the farm. In addition, they help to prevent erosion and give protection to wildlife. Ten sawmills are located in the county. In 1954, a total of 16,725 cords of wood was cut for fuel on 935 farms; 253,743 fence posts were harvested on 949 farms; and 1,576,000 board feet of sawlogs and veneer logs were cut on 491 farms.

Management of woodland.—The value of farm woodlots and of other wooded tracts can be increased by protecting them from grazing and from trampling by livestock. It can also be increased by preventing fires, removing cull trees systematically, and thinning the trees so that the more desirable ones can grow. According to statistics kept by the Soil Conservation Service, 43,157 acres of woodland was protected from fire and grazing in 1957 by farmers who were cooperating with the Buffalo County Soil Conservation District.

The management of a wooded area depends on its present condition and on the kinds of trees to be grown. In some areas replanting may be necessary. Beginning in about 1933, a program was begun to plant trees around the heads of the larger gullies and to plant shelterbelts. Now, trees are often planted between standing trees in open woodland, or complete plantations are made on steep, sandy, or severely eroded areas. Red (Norway) pine is the most common species planted.

When planting trees, the site is important. Trees on areas that have slopes facing south or southwest are exposed to heat and to dry winds both in summer and in winter. They do not make so high a yield as those on slopes facing north or east, nor are the products of so high a quality.

Trees do not do as well on prairie soils as they do on soils formed under timber. Fewer kinds of trees will grow on the prairie soils, and the products are of poorer quality than those obtained from trees on soils formed under timber. Generally, too, the prairie soils are more desirable for field crops, and little or no timber is grown on them.

Kinds of trees.—Most of the trees in Buffalo County are hardwoods. Red oaks and scattered hickory trees grow on the south- and west-facing slopes. In a few places on the steep bluffs along the Mississippi River, redcedar makes up a large part of the stand. Red oak, basswood, butternut, white birch, aspen, and a few white oaks and hard maples make up most of the stand on north- and east-facing slopes. On the bottoms along streams, the stands consist mainly of soft maple, elm, river birch, cottonwood, and willow, but there are a few black ash trees.

Estimated yields.—Table 4 gives estimated potential yields of timber for the soil types and miscellaneous land types of the county. The figures given are for well-managed stands of hardwoods and pines that have good tree density. They were based primarily on interviews with foresters, on results of tests made on woodland test plots, and on observations made by soil surveyors and woodland conservationists. The research information consists of production figures supplied by the Lake States Forest Experiment Station (*2*) and the Wisconsin Conservation Department (*8*), with interpolations for individual soil types by the Soil Conservation Service.

Because trees make favorable growth under a wider range of soil conditions than do field crops, no distinction was made in table 4 for differences in slope.

Most woodland areas in the county are producing far below their potential. Better management than is presently practiced will be required to obtain the yields shown in table 4. Many areas in timber have low tree density as the result of logging, fires, and grazing by livestock. Selective cutting has not been practiced. Therefore, the trees are inferior and the stands are poor. With good management, including selective cutting and protection from fire and grazing, many of these wooded areas can develop into excellent stands of salable timber.

Engineering Properties of the Soils

This section contains information that will help engineers to select sites for buildings for residential, industrial, and other purposes; to choose locations for highways; to determine the trafficability of soils; and to locate sand, gravel, and rock for use in construction. It will also help in planning dams, ponds, and other structures to control floods and conserve soil and water.

The soil map and accompanying report are too generalized for some engineering purposes. They should be used only in planning more detailed field surveys to determine the in-place condition of soils at proposed sites for construction. After testing the soil materials and observing their behavior in place and under varying conditions, the engineer can anticipate, to some extent, the engineering properties of individual soils wherever they are mapped.

Some of the terms used by the soil scientist may not be familiar to the engineer; other terms, though familiar, have special meanings in soil science. The terms used in the three tables in this section, as well as other special terms used in the report, are discussed in the section "Descriptions of Soils" or are defined in the Glossary.

Soil test data

Engineers who work with foundations and embankments need to know about the soils. Information about soils that cover a large area is especially valuable in the construction of highways. This is obtained partly by observing soils in the field, by studying the interpretations made by soil scientists, and by studying the soil map.

Table 5 describes the soils and their properties significant to engineering. It was prepared mainly for agricultural engineers, but it has information that is important in other fields of engineering and agriculture. The information about many of the soils is estimated because samples were taken from the soils in only eight soil series in the county (see table 7). The estimates given in table 5 were made by comparing the soil with a soil that had been tested and by making observations and determinations in the field. Other information about the properties of the soils can be obtained by referring to the sections "Descriptions of Soils" and "Detailed Descriptions of Soil Profiles."

Table 6 gives information about properties of the soils that affect engineering. It describes the erodibility hazard for each soil; the suitability of each soil as a source of topping material, of sand, or of fill material for earthen embankments; and the suitability of each soil as a site for ponds, for drainage, for irrigation, and for terraces or diversions. Ratings in this table are based on data in table 7, on information in other sections of the report, and on experience with the same kinds of soils in other areas.

Table 7 gives data showing moisture-density relations, results of mechanical analysis, and the liquid limit and plasticity index for several of the principal soils. Some of the soil samples described in table 7 were collected by the Soil Conservation Service and were tested by the Bureau of Public Roads. The rest were collected and tested by the Soil Conservation Service. For the samples tested by the Bureau of Public Roads, the engineering soil classifications given in this table (AASHO and Unified) were based on data obtained by mechanical analysis and by tests to determine the liquid limit and plasticity index. Results of the mechanical analyses of the Bureau of Public Roads were determined by using combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method are not suitable for naming the textural classes of soils that are used by the Soil Conservation Service.

The tests to show liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a soil material increases from a dry state, the material changes from a solid to a semisolid or plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a solid to a plastic state. The

TABLE 4.—*Estimated potential annual acre yields of wood products from well-managed stands that have good tree density*

[Dashes indicate trees do not grow on soil type or that the soil type is not suited to the species indicated]

Soil	North- and east-facing sites [1]				South- and west-facing sites [2]			
	Hardwoods		Conifers		Hardwoods		Conifers	
	Bd. ft. (Scribner)	Cords	Bd. ft. (Scribner)	Cords	Bd. ft. (Scribber)	Cords	Bd. ft. (Scribner)	Cords
Arenzville silt loam	275	1.0	250	0.8	----	----	----	----
Bertrand silt loam	250	.8	250	.8	----	----	----	----
Boone fine sand	----	.3	175	.6	----	----	150	0.5
Burkhardt sandy loam	----	----	----	----	----	----	----	----
Chaseburg silt loam	275	1.0	----	----	----	----	----	----
Curran silt loam	150	.5	----	----	----	----	----	----
Dakota fine sandy loam [3]	100	.3	300	1.0	----	----	----	----
Dakota loam	150	.5	300	1.0	----	----	----	----
Downs silt loam	225	.7	----	----	150	0.5	----	----
Downs silt loam, benches	225	.7	----	----	150	.5	----	----
Dubuque silt loam	150	.5	----	----	100	.3	----	----
Dubuque silt loam, deep	200	.7	----	----	125	.4	----	----
Dubuque soils	----	----	----	----	----	----	----	----
Duelm fine sandy loam	----	----	----	----	----	----	----	----
Ettrick silt loam	100	.3	----	----	----	----	----	----
Ettrick silt loam, sandy substratum	100	.3	----	----	----	----	----	----
Fayette silt loam, uplands	225	.7	300	1.0	150	.5	250	.8
Fayette silt loam, valleys	275	.9	300	1.0	175	.6	250	.8
Gale silt loam	175	.6	300	1.0	100	.3	200	.7
Gotham loamy fine sand [3]	100	.3	250	.8	----	----	----	----
Granby sandy loam	150	.5	150	.5	----	----	----	----
Granby fine sandy loam, stratified substratum variant	150	.5	----	----	----	----	----	----
Gullied land	----	----	----	----	----	----	----	----
Hesch fine sandy loam	125	.4	300	1.0	----	.2	200	.7
Hesch loam	150	.5	300	1.0	100	.3	200	.7
Hixton fine sandy loam	150	.5	300	1.0	----	.2	200	.7
Hixton loam	175	.6	300	1.0	100	.3	200	.7
Hubbard soils	----	----	----	----	----	----	----	----
Huntsville silt loam	----	----	----	----	----	----	----	----
Jackson silt loam	200	.7	----	----	----	----	----	----
Judson silt loam	----	----	----	----	----	----	----	----
Lindstrom silt loam	275	.9	----	----	175	.6	----	----
Loamy alluvial land, poorly drained	150	.5	----	----	----	----	----	----
Loamy alluvial land	250	.8	250	.8	----	----	----	----
Marsh	----	----	----	----	----	----	----	----
Medary silt loam	200	.7	200	.7	----	----	----	----
Meridian fine sandy loam [3]	150	.5	300	1.0	----	----	----	----
Meridian loam	175	.6	300	1.0	----	----	----	----
Meridian loam, moderately well drained variant	175	.6	200	.7	----	----	----	----
Norden silt loam	225	.8	250	.8	175	.6	250	.8
Norden fine sandy loam	150	.5	250	.8	100	.3	200	.7
Norden loam	200	.7	250	.8	175	.6	250	.8
Orion silt loam	200	.7	----	----	----	----	----	----
Peat and Muck, shallow	125	.5	----	----	----	----	----	----
Peat and Muck, deep	150	.5	----	----	----	----	----	----
Plainfield loamy fine sand [3]	----	----	175	.6	----	----	----	----
Plainfield loamy fine sand, loamy substrata variant [3]	----	----	250	.8	----	----	----	----
Richwood silt loam	----	----	----	----	----	----	----	----
Riverwash	----	----	----	----	----	----	----	----
Rowley silt loam	----	----	----	----	----	----	----	----
Sandy alluvial land, poorly drained	100	.3	----	----	----	----	----	----
Sandy alluvial land	100	.3	----	----	----	----	----	----
Sparta loamy fine sand [3]	----	----	----	.5	----	----	----	----
Sparta loamy fine sand, loamy substrata variant [3]	----	----	----	.7	----	----	----	----
Sparta and Plainfield fine sands and Dune land [3]	----	----	----	.3	----	----	----	----
Steep stony and rocky land	150	.5	----	----	75	.2	----	----
Tell silt loam [3]	200	.6	300	1.0	----	----	----	----
Terrace escarpments, loamy	175	.6	300	1.0	75	.2	----	.5
Terrace escarpments, sandy	----	----	200	.7	----	----	----	.3
Toddville silt loam	----	----	----	----	----	----	----	----
Trempe loamy fine sand [3]	150	.5	250	.8	----	----	----	----
Urne-Norden loams	175	.6	200	.7	100	.3	150	.5
Wallkill silt loam	200	.7	300	1.0	----	----	----	----
Waukegan silt loam	----	----	----	----	----	----	----	----

[1] In narrow valleys and in areas where the trees are partly protected from heat and from drying winds.
[2] On ridgetops and slopes where the soils are exposed to high temperatures and drying winds.
[3] In areas where the water table is within 10 feet of the surface, yields of timber are higher.

liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Tests to show liquid limit and plastic limit were not run in the samples tested by the Soil Conservation Service. For the samples tested by SCS, the data shown in table 7 under the columns for liquid limit and plasticity index are estimates based on comparisons with other soils. The American Association of State Highway Officials (AASHO) and the Unified Classification rating for these samples are also estimates based on comparisons with similar soils.

Problems in engineering

Soils that erode easily or that are poorly drained present special problems in engineering. For example, the soils that have clean sand in the profile and a water table far from the surface are susceptible to erosion by wind when they are exposed in road cuts.

In constructing roads it is particularly important to know the location of poorly drained soils. In such areas seepage along the backslopes of cuts may result in slumping or sliding of the overlying material. A perched water table beneath a pavement may cause the foundation material to be saturated. Alternate freezing and thawing of this saturated material results in differential change in volume and differences in bearing capacity. Consequently, before beginning to construct a road, it is important to know the location of poorly drained areas. These poorly drained areas should be inspected in greater detail than others to determine the need for interceptor drains and underdrains.

The soils of uplands in Buffalo County are well drained, but extensive areas of poorly drained soils occur on the terraces and on bottoms along streams. In some of these areas there are deposits of organic material. If deposits of organic matter are present they are detrimental to most types of construction and should be removed.

Roads through poorly drained areas must be provided with adequate drainage. Some of the sandy soils that have a high water table may be made more suitable as a source of borrow material, as well as for excavation for roads, if drainage ditches are constructed before earthwork is started. Some areas in the lower parts of the bottom lands are flooded each year. Therefore, consideration should be given to constructing embankments to protect structures on these lowlands.

Soil materials that contain a high proportion of very fine sand, silt, and clay are very susceptible to frost action. They are, therefore, less suitable than coarser textured soils for use in the upper parts of subgrades. They are also less suitable for the foundations of pavements.

Agriculture

The first permanent settlements in the area that is now Buffalo County were made about 1842. In 1847, other settlers came to the area from Switzerland. Later, between 1850 and 1860, many settlers arrived from Norway, Germany, and Switzerland, and still later, during the period from 1860 to 1870, a new group of settlers arrived from Germany. The settlers were attracted by the good soils and water and by the plentiful grass.

The settlers found that the land was fairly easy to break. Much of the area consisted of natural prairies, and there were only a few scattered trees. The prairies could be broken and farmed with little difficulty. Stones were almost entirely absent, except on the steep bluffs like those along the Mississippi River.

During the early years, when farming was developing in the county, lumbering was important. In 1857, the first sawmill was established at what is now the site of Buffalo City. As logging centers were established at Eau Claire and Chippewa Falls, logging operations moved into the northern part of the county.

Early agriculture in the county consisted mainly of growing wheat. By 1878, a custom flourmill had been established at Mondovi. Local farmers had their wheat ground at the mill and transported the flour by wagon to the large market at Eau Claire or shipped it across the river to Winona, Minn. After 1880, the growing of wheat declined rapidly because of increasing competition from States farther west. Dairying then became the principal source of income on the farms.

In the following pages the present-day agriculture of the county is described. The statistics used are mainly from reports published by the U.S. Bureau of the Census.

Land Use

In 1954, farms occupied 395,848 acres in Buffalo County, or 86.9 percent of the total land area. In 1954, the farmland by use and the acreage used for each purpose were as follows:

	Acres	*Percent*
Cropland, total	183, 037	46. 2
Harvested	135, 163	34. 1
Used only for pasture	41, 561	10. 5
Not harvested or pastured	6, 313	1. 6
Woodland, total	154, 358	39. 0
Pastured	76, 972	19. 4
Not pastured	77, 386	19. 6
Other land pastured (not cropland and not woodland)	36, 786	9. 3
Land pastured, total	155, 319	39. 2
Other land (house lots, roads, wasteland, and so on)	21, 667	5. 5

Types and Sizes of Farms

Buffalo County had a total of 1,682 farms in 1954. Of these, 178 were miscellaneous and unclassified. The rest, listed according to the major source of income, were as follows:

	Number	*Percent*
Dairy farms	1, 001	59. 5
Poultry farms	20	1. 2
Livestock farms other than dairy and poultry	278	16. 5
General farms	150	8. 9
Primarily livestock	115	6. 8
Crop and livestock	35	2. 1
Cash grain	55	3. 3

The size of farms in the county varies greatly, but the average-sized farm in 1954 was 235.3 acres. In contrast, the average-sized farm in 1920 was only 200.2 acres. As the size of farms increased, the number of farms decreased. In 1954, there were approximately three-fourths as many farms in the county as there were early in the century.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
Ar	Arenzville silt loam.	Moderately well drained to well drained, deep, silty alluvial soil on the nearly level flood plains of streams; the surface layer is a friable, granular silt loam; the underlying material is friable, massive silt that contains a few lenses of fine sand.	20 feet or more
BeB BeA BeB2 BeC BeC2	Bertrand silt loam, 2 to 6 percent slopes. Bertrand silt loam, 0 to 2 percent slopes. Bertrand silt loam, 2 to 6 percent slopes, moderately eroded. Bertrand silt loam, 6 to 12 percent slopes. Bertrand silt loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, silty soils on terraces along streams; the surface layer is friable, granular silt loam; the subsoil is firm, blocky silty clay loam; and the underlying material is friable, stratified silt and sand at depths below 42 inches.	20 feet or more
BoB2 BoC2 BoD2	Boone fine sand, 2 to 6 percent slopes, eroded. Boone fine sand, 6 to 12 percent slopes, eroded. Boone fine sand, 12 to 40 percent slopes, eroded.	Excessively drained, sandy upland soils over sandstone bedrock; the surface layer is very friable, single-grained fine sand or loamy fine sand; the subsoil is loose, single-grained fine sand.	20 inches to 4 feet.
BuA BuB BuC2	Burkhardt sandy loam, 0 to 2 percent slopes. Burkhardt sandy loam, 2 to 6 percent slopes. Burkhardt sandy loam, 6 to 12 percent slopes, moderately eroded.	Somewhat excessively drained soils on terraces along streams; formed in coarse-textured outwash, 18 to 24 inches thick over sand; the surface layer is very friable, granular sandy loam; the subsoil is very friable, weak, blocky sandy loam; and the underlying material is stratified, loose, single-grained sand and gravel.	20 feet or more
CaA CaB CaC	Chaseburg silt loam, 0 to 2 percent slopes. Chaseburg silt loam, 2 to 6 percent slopes. Chaseburg silt loam, 6 to 12 percent slopes.	Well drained to moderately well drained, silty alluvial soils in narrow valleys and on fans; the surface layer is friable, granular fine sandy loam or silt loam over a substratum of friable, massive silt loam; in some places there are strata of fine sand in the profile, and in places there are stones on the surface.	More than 4 feet
Cu	Curran silt loam.	Somewhat poorly drained, nearly level, silty soil on terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam; and the substratum is massive, firm, silty material; in places stratified sand and silt occur below a depth of 40 inches.	20 feet or more
DbA DbB	Dakota loam, 0 to 2 percent slopes. Dakota loam, 2 to 6 percent slopes.	Well-drained, nearly level to gently sloping soils on terraces along streams; formed in medium-textured outwash 24 to 36 inches thick over sand; the surface layer is friable, granular loam; the subsoil is friable, blocky loam underlain by stratified, loose, single-grained sand that contains a few pebbles.	20 feet or more
DaA DaB DaB2	Dakota fine sandy loam, 0 to 2 percent slopes. Dakota fine sandy loam, 2 to 6 percent slopes. Dakota fine sandy loam, 2 to 6 percent slopes, moderately eroded.	Somewhat excessively drained soils on terraces along streams; formed in coarse-textured outwash 24 to 36 inches thick over sand; the surface layer is very friable, granular sandy loam; the subsoil is friable, blocky sandy loam to loam; and the underlying material is stratified, loose, single-grained sand that contains a few pebbles.	20 feet or more
DcB DcB2 DcC2	Downs silt loam, 2 to 6 percent slopes. Downs silt loam, 2 to 6 percent slopes, moderately eroded. Downs silt loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, deep, silty soils on upland ridges; the surface layer is friable, granular silt loam; the subsoil is firm, blocky silty clay loam; and the substratum is friable, massive silt loam.	More than 4 feet
DdB DdC2 DdD2	Downs silt loam, benches, 2 to 6 percent slopes. Downs silt loam, benches, 6 to 12 percent slopes, moderately eroded. Downs silt loam, benches, 12 to 20 percent slopes, moderately eroded.	Well-drained, deep, silty soils on high stream benches; the surface layer is friable, granular silt loam; the subsoil is firm, blocky, light silty clay loam; and the substratum is weakly laminated, friable silt loam.	4 to 15 feet

See footnotes at end of table.

and estimates of properties significant to engineering

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
----------	Moderate	Intermediate	5 to 10 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to neutral.
----------	Moderate	Intermediate	More than 10 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.
Cambrian sandstone.	Very rapid	High	Very deep	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to strongly acid.
----------	Moderately rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
Cambrian sandstone	Moderate	Intermediate	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to neutral.
----------	Moderately slow	Intermediate	3 to 6 feet	Slightly sticky; slightly plastic.	Slightly sticky; slightly plastic.	Slightly acid to strongly acid.
----------	Moderate	Intermediate	More than 5 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic	Medium acid to neutral.
----------	Moderately rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to neutral.
Lower Magnesian dolomite.	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.
Franconia sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
DeB DeB2 DeC DeC2 DeD DeD2 DeE DeE2 DeF2	Dubuque silt loam, 2 to 6 percent slopes. Dubuque silt loam, 2 to 6 percent slopes, moderately eroded. Dubuque silt loam, 6 to 12 percent slopes. Dubuque silt loam, 6 to 12 percent slopes, moderately eroded. Dubuque silt loam, 12 to 20 percent slopes. Dubuque silt loam, 12 to 20 percent slopes, moderately eroded. Dubuque silt loam, 20 to 30 percent slopes. Dubuque silt loam, 20 to 30 percent slopes, moderately eroded. Dubuque silt loam, 30 to 40 percent slopes, eroded.	Well-drained soils on upland ridges; formed in a thin layer of silt over reddish clay that overlies limestone; the surface layer is friable, granular silt loam; the subsoil is firm, angular blocky silty clay loam; and the substratum is angular blocky clay that contains angular fragments of chert in many places.	2 to 5 feet
DpB DpB2 DpC DpC2 DuC3 DpD DpD2 DuD3 DpE DpE2	Dubuque silt loam, deep, 2 to 6 percent slopes. Dubuque silt loam, deep, 2 to 6 percent slopes, moderately eroded. Dubuque silt loam, deep, 6 to 12 percent slopes. Dubuque silt loam, deep, 6 to 12 percent slopes, moderately eroded. Dubuque soils, deep, 6 to 12 percent slopes, severely eroded. Dubuque silt loam, deep, 12 to 20 percent slopes. Dubuque silt loam, deep, 12 to 20 percent slopes, moderately eroded. Dubuque soils, deep, 12 to 20 percent slopes, severely eroded. Dubuque silt loam, deep, 20 to 30 percent slopes. Dubuque silt loam, deep, 20 to 30 percent slopes, moderately and severely eroded.	Well-drained soils on upland ridges; formed in a moderately deep blanket of silt that overlies reddish clay; the surface layer is friable, granular silt loam; the subsoil is firm, blocky silty clay loam; and the substratum is angular blocky, gritty clay that contains many fragments of chert and overlies limestone bedrock.	3 to 6 feet
DsC3 DsD3 DsE3	Dubuque soils, 6 to 12 percent slopes, severely eroded. Dubuque soils, 12 to 20 percent slopes, severely eroded. Dubuque soils, 20 to 30 percent slopes, severely eroded.	Well-drained, thin soils on upland ridges; formed in reddish clay that overlies limestone bedrock; the typical surface layer is firm, granular silty clay loam; the subsoil is angular blocky silty clay; and the substratum is angular blocky clay that contains many fragments of chert.	1 to 3 feet
Dv	Duelm fine sandy loam.	Moderately well drained to somewhat poorly drained soil on nearly level terraces along streams; formed in medium-textured outwash 24 to 36 inches thick; the surface layer is friable, granular loam or fine sandy loam; the subsoil, a weak, blocky loam or fine sandy loam, is underlain by stratified, loose, single-grained sand that contains a few pebbles.	20 feet or more
Dw	Duelm fine sandy loam, high water table.	Poorly drained soil in nearly level areas or depressions on terraces along streams; formed in medium-textured outwash 24 to 36 inches thick over sand; the surface layer is friable or mucky fine sandy loam; the subsoil, a weak, blocky loam, is underlain by stratified, loose, single-grained sand containing a few pebbles.	20 feet or more
Es	Ettrick silt loam.	Poorly drained, deep soil in nearly level areas or in depressions; formed in silty alluvium on stream bottoms; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam that extends to a depth of 36 to 48 inches; the underlying material is massive silt.	20 feet or more
Et	Ettrick silt loam, sandy substratum.	Poorly drained soil in nearly level areas or in depressions; formed in silty alluvium on stream bottoms; the surface layer is friable, granular silt loam; the subsoil, a weakly developed silty clay loam, extends to a depth of 24 to 36 inches; it overlies strata of fine sand and coarse silt.	20 feet or more

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
Lower Magnesian dolomite.	Moderately slow	Intermediate	Very deep	Slightly sticky; slightly plastic.	Very sticky; very plastic.	Strongly acid to slightly acid.
Lower Magnesian dolomite.	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Very sticky; very plastic.	Slightly acid to medium acid.
Lower Magnesian dolomite.	Moderately slow	Intermediate	Very deep	Slightly plastic	Very sticky; very plastic.	Strongly acid to slightly acid.
	Moderate	Intermediate	3 to 5 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.
	Moderate	Intermediate	½ to 2 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
	Moderately slow	Intermediate	1 to 2 feet	Slightly sticky; slightly plastic.	Slightly sticky; slightly plastic.	Neutral to mildly alkaline.
	Moderately slow to slow.	Intermediate	1 to 2 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Neutral to mildly alkaline.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
FaB	Fayette silt loam, uplands, 2 to 6 percent slopes.	Well-drained, deep, silty soils on upland ridges; the surface layer is friable, granular silt loam; the subsoil is firm, blocky silty clay loam; and the substratum is friable, massive silt loam.	More than 4 feet.
FaB2	Fayette silt loam, uplands, 2 to 6 percent slopes, moderately eroded.		
FaC	Fayette silt loam, uplands, 6 to 12 percent slopes.		
FaC2	Fayette silt loam, uplands, 6 to 12 percent slopes, moderately eroded.		
FaC3	Fayette silt loam, uplands, 6 to 12 percent slopes, severely eroded.		
FaD	Fayette silt loam, uplands, 12 to 20 percent slopes.		
FaD2	Fayette silt loam, uplands, 12 to 20 percent slopes, moderately eroded.		
FaD3	Fayette silt loam, uplands, 12 to 20 percent slopes, severely eroded.		
FaE	Fayette silt loam, uplands, 20 to 30 percent slopes.		
FaE2	Fayette silt loam, uplands, 20 to 30 percent slopes, moderately eroded.		
FaE3	Fayette silt loam, uplands, 20 to 30 percent slopes, severely eroded.		
FvB	Fayette silt loam, valleys, 2 to 6 percent slopes.	Well-drained, deep, silty soils on valley slopes of uplands; the surface layer is friable, granular silt loam; the subsoil is firm, blocky, light silty clay loam; and the substratum is friable, massive, silty material; thin strata of fine sandy loam are at the surface or in the solum.	More than 4 feet
FvC	Fayette silt loam, valleys, 6 to 12 percent slopes.		
FvC2	Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded.		
FvC3	Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded.		
FvD	Fayette silt loam, valleys, 12 to 20 percent slopes.		
FvD2	Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded.		
FvD3	Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded.		
FvE	Fayette silt loam, valleys, 20 to 30 percent slopes.		
FvE2	Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded.		
FvE3	Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded.		
GaB2	Gale silt loam, 2 to 6 percent slopes, moderately eroded.	Well-drained, moderately deep, silty soils underlain by sandstone on valley slopes of uplands; the surface layer is friable, granular silt loam; the underlying material is firm, blocky silty clay loam that grades to the substratum of loose, single-grained fine sand, which, in turn, rests on sandstone bedrock.	2 to 4 feet
GaC2	Gale silt loam, 6 to 12 percent slopes, moderately eroded.		
GaC3	Gale silt loam, 6 to 12 percent slopes, severely eroded.		
GaD	Gale silt loam, 12 to 20 percent slopes.		
GaD2	Gale silt loam, 12 to 20 percent slopes, moderately eroded.		
GaD3	Gale silt loam, 12 to 20 percent slopes, severely eroded.		
GaE	Gale silt loam, 20 to 30 percent slopes.		
GaE2	Gale silt loam, 20 to 30 percent slopes, moderately eroded.		
GaE3	Gale silt loam, 20 to 30 percent slopes, severely eroded.		
GoA	Gotham loamy fine sand, 0 to 2 percent slopes.	Somewhat excessively drained, sandy soils on terraces along streams; the surface layer is very friable, granular loamy fine sand; the subsoil is friable, blocky sandy loam to loamy fine sand; and the underlying material is loose, single-grained fine sand, which is at a depth of more than 2 feet.	20 feet or more
GoB	Gotham loamy fine sand, 2 to 6 percent slopes.		
GoB2	Gotham loamy fine sand, 2 to 6 percent slopes, eroded.		

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
Lower Magnesian dolomite.	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.
Cambrian sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic	Nonsticky; nonplastic.	Slightly acid to medium acid.
Cambrian and St. Peter sandstones.	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.
	Moderately rapid	High	More than 10 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
Gr	Granby sandy loam.	Poorly drained soil in low spots on terraces along streams; the surface layer is friable, granular loam; it is underlain by a platy loam that extends to a depth of 2 to 3 feet; the underlying material is loose sand that contains strata of finer textured material.	More than 3 feet.
Gs	Granby fine sandy loam, stratified substratum variant.	Somewhat poorly drained, nearly level to gently undulating soils on terraces along streams; the surface layer is friable, granular fine sandy loam; the subsoil is a firm, blocky sandy clay loam to loam; the underlying material consists of alternate layers of sands, silts, and clays.	20 feet or more
Gu	Gullied land.	Land dissected by deep gullies; its texture ranges from sand to silt.	Deep
HcB	Hesch fine sandy loam, 2 to 6 percent slopes.	Somewhat excessively drained, sandy soils on upland valley slopes; the surface layer is very friable, granular sandy loam; the subsoil is blocky fine sandy loam; and the underlying material is loose, single-grained sand that grades to sandstone bedrock.	2½ to 4 feet
HcC2	Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded.		
HcD2	Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded.		
HcE	Hesch fine sandy loam, 20 to 30 percent slopes.		
HcE2	Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded.		
HeC2	Hesch loam, 6 to 12 percent slopes, moderately eroded.	Well-drained soils on valley slopes; formed in medium-textured materials 2 to 3 feet thick over sandstone; the surface layer is friable, granular loam; the subsoil is friable, blocky fine sandy loam to sandy clay loam; it overlies loose, single-grained fine sand.	2½ to 4 feet
HeD2	Hesch loam, 12 to 20 percent slopes, moderately eroded.		
HeE	Hesch loam, 20 to 30 percent slopes.		
HeE2	Hesch loam, 20 to 30 percent slopes, moderately eroded.		
HfB2	Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded.	Somewhat excessively drained, sandy soils on upland ridges and valley slopes; the surface layer is very friable, granular sandy loam; the subsoil is firm, blocky loam; and the substratum is loose, single-grained fine sand.	2½ to 4 feet
HfC2	Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded.		
HfC3	Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded.		
HfD	Hixton fine sandy loam, 12 to 20 percent slopes.		
HfD2	Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded.		
HfD3	Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded.		
HsB	Hixton loam, 2 to 6 percent slopes.	Well-drained, medium-textured soils on upland ridges and valley slopes; the surface layer is very friable, granular loam; the subsoil is firm, blocky loam, and the substratum is loose, single-grained fine sand over sandstone.	2½ to 4 feet
HsB2	Hixton loam, 2 to 6 percent slopes, moderately eroded.		
HsC	Hixton loam, 6 to 12 percent slopes.		
HsC2	Hixton loam, 6 to 12 percent slopes, moderately eroded.		
HsC3	Hixton loam, 6 to 12 percent slopes, severely eroded.		
HsD	Hixton loam, 12 to 20 percent slopes.		
HsD2	Hixton loam, 12 to 20 percent slopes, moderately eroded.		
HsD3	Hixton loam, 12 to 20 percent slopes, severely eroded.		
HtE	Hixton loam and fine sandy loam, 20 to 30 percent slopes.		
HtE2	Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded.		
HtE3	Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded.		
HtF	Hixton loam and fine sandy loam, 30 to 40 percent slopes.		
HtF2	Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded.		

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
------	Moderately slow	Intermediate	2 to 5 feet	Slightly sticky; slightly plastic.	Slightly sticky; slightly plastic.	Strongly acid to medium acid.
(5)	Moderate	Intermediate	4 to 6 feet	Slightly sticky; slightly plastic.	Slightly sticky; slightly plastic.	Medium acid to slightly acid.
------	------	------	Deep	------	------	
Cambrian sandstone	Moderately rapid	High	Very deep	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
Cambrian sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to neutral.
Cambrian sandstone	Moderately rapid	High	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.
Cambrian sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
HuA HuB	Hubbard soils, 0 to 2 percent slopes. Hubbard soils, 2 to 6 percent slopes.	Somewhat excessively drained, sandy soils on stream terraces; the surface layer is very friable, granular sandy loam or loamy fine sand; the subsoil is a poorly defined, friable sandy loam; it is underlain by loose, single-grained sand at a depth ranging from 2 to 3 feet.	20 feet or more__
Hv	Huntsville silt loam.	Moderately well drained to well drained, deep, silty alluvial soil on the nearly level flood plains of streams; the solum consists of friable silt loam; it is more than 42 inches thick and is high in organic matter.	20 feet or more__
JaA JaB JaB2	Jackson silt loam, 0 to 2 percent slopes. Jackson silt loam, 2 to 6 percent slopes. Jackson silt loam, 2 to 6 percent slopes, moderately eroded.	Moderately well drained, deep, silty soils on nearly level to gently sloping terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam; it overlies a friable, massive, silty substratum; in places stratified fine sand and silt are at a depth below 42 inches.	20 feet or more__
JuA JuB JuC	Judson silt loam, 0 to 2 percent slopes. Judson silt loam, 2 to 6 percent slopes. Judson silt loam, 6 to 12 percent slopes.	Moderately well drained to well drained, silty alluvial soils in narrow valleys and on fans; the surface layer is friable, granular silt loam; the subsoil is a friable, blocky, heavy silt loam; it overlies a friable, massive, silty substratum; in places there are thin layers of fine sand in the profile.	More than 4 feet_
LsC LsC2 LsD2 LsE LsE2	Lindstrom silt loam, 6 to 12 percent slopes. Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded. Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded. Lindstrom silt loam, 20 to 30 percent slopes. Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded.	Well-drained, deep, silty soils on valley slopes in uplands; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky, light silty clay loam; it overlies a friable, massive, silty substratum; in places there are thin layers of fine sand in the profile.	More than 4 feet_
Lv	Loamy alluvial land, poorly drained.	Poorly drained, mixed, sandy and silty (mostly silty) soil materials, more than 40 inches thick, on the nearly level flood plains of streams.	20 feet or more_
Lw	Loamy alluvial land.	Moderately well drained, mixed, sandy and silty (mostly silty) soil materials, more than 40 inches thick, on the nearly level flood plains of streams.	20 feet or more__
Ma	Marsh.	Poorly drained, mixed organic and alluvial deposits along stream bottoms; flooded during most of the year.	20 feet or more__
MdA MdB2	Medary silt loam, 0 to 2 percent slopes. Medary silt loam, 2 to 6 percent slopes, moderately eroded.	Well drained to moderately well drained, deep soils on nearly level to gently sloping terraces along streams; the surface layer is friable, granular silt loam; the subsoil is very firm, angular blocky clay; and the substratum is massive, red clay; in places sand occurs at a depth below 42 inches.	20 feet or more__
MeA MeB MeB2 MeC2	Meridian fine sandy loam, 0 to 2 percent slopes. Meridian fine sandy loam, 2 to 6 percent slopes. Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded. Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded.	Somewhat excessively drained, sandy soils that are 2 to 3 feet thick over sand and on terraces along streams; the surface layer is very friable, granular sandy loam; the subsoil is friable, blocky loam; and the substratum is loose, single-grained fine sand; thin layers of finer textured material occur in places in the substratum.	20 feet or more__
MmA MmB MmB2 MmC2	Meridian loam, 0 to 2 percent slopes. Meridian loam, 2 to 6 percent slopes. Meridian loam, 2 to 6 percent slopes, moderately eroded. Meridian loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, medium-textured soils that are 2 to 3 feet thick over sand and on terraces along streams; the surface layer is friable, granular loam; the subsoil is firm, blocky loam to sandy clay loam; and the substratum is loose, single-grained sand; in places there are thin layers of finer textured material in the substratum.	20 feet or more__

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
----------	Moderately rapid	High	More than 6 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to neutral.
----------	Moderate	Intermediate	5 to 10 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Neutral to mildly alkaline.
----------	Moderate	Intermediate	5 to 10 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to strongly acid.
Cambrian sandstone	Moderate	Intermediate	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Neutral to slightly acid.
Cambrian sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
----------	Moderate	Intermediate	1 to 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
(5)	Moderate	Intermediate	5 to 10 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
----------	----------	----------	Less than 1 foot.	----------	----------	----------
----------	Moderately slow	Low	Deep	Very sticky; very plastic.	Very sticky; very plastic.	Medium acid to slightly acid.
----------	Moderately rapid	High	More than 5	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
----------	Moderate	Intermediate	More than 10	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
MnA MnB	Meridian loam, moderately well drained variant, 0 to 2 percent slopes. Meridian loam, moderately well drained variant, 2 to 6 percent slopes.	Moderately well drained, medium-textured, nearly level to gently undulating soils on terraces along streams; the surface layer is friable, granular loam; the subsoil is firm, blocky loam; and the underlying material is loose, single-grained, stratified sand at a depth of 2 to 3 feet.	20 feet or more
NfB2 NfC2 NfD NfD2 NfD3	Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded. Norden fine sandy loam. 6 to 12 percent slopes, moderately eroded. Norden fine sandy loam, 12 to 20 percent slopes. Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded. Norden fine sandy loam, 12 to 20 percent slopes, severely eroded.	Well-drained, sandy soils formed in medium-textured materials, 2 to 3 feet thick, over fine-grained, greenish sandstone of the Franconia formation; the soils are on valley slopes; the surface layer is friable, granular silt loam; the subsoil is blocky fine sandy loam to gritty silt loam; it rests on partially weathered, fine-grained sandstone.	2½ to 4 feet
NoC NoC2 NoD2 NoE2	Norden loam, 6 to 12 percent slopes. Norden loam, 6 to 12 percent slopes, moderately eroded. Norden loam, 12 to 20 percent slopes, moderately eroded. Norden loam, 20 to 30 percent slopes, moderately eroded.	Well-drained, medium-textured soils, 2 to 3 feet thick over fine-grained, greenish sandstone of the Franconia formation; the soils are predominantly on valley slopes; the surface layer is a friable, granular loam; the subsoil is a firm, blocky very fine sandy loam or gritty silt loam that rests on partially weathered, greenish, fine-grained sandstone.	3 to 4 feet
GfC2 GfD GfD2 GfD3 GfE GfE2 GfE3	Norden silt loam, 6 to 12 percent slopes, moderately eroded. Norden silt loam, 12 to 20 percent slopes. Norden silt loam, 12 to 20 percent slopes, moderately eroded. Norden silt loam, 12 to 20 percent slopes, severely eroded. Norden silt loam, 20 to 30 percent slopes. Norden silt loam, 20 to 30 percent slopes, moderately eroded. Norden silt loam, 20 to 30 percent slopes, severely eroded.	Well-drained, silty soils of uplands, predominantly on valley slopes; the soils are 28 to 42 inches thick over fine-grained, greenish sandstone of the Franconia formation; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam that rests on partially weathered, fine-grained sandstone.	3 to 5 feet
Or	Orion silt loam.	Somewhat poorly drained, deep, silty alluvial soil on nearly level flood plains along streams; the surface layer is friable, granular silt loam; it overlies friable, laminated silt loam that commonly contains lenses of fine sand.	20 feet or more
Pa	Peat and Muck, shallow.	Poorly drained organic soils in depressions on the flood plains of streams.	20 feet or more
Pd	Peat and Muck, deep.	Poorly drained organic soils in depressions on the flood plains of streams; the organic materials are 12 to 42 inches thick, and in most places they overlie sand; in a few places they overlie loam.	Very deep
PfA PfB PfB2 PfC2	Plainfield loamy fine sand, 0 to 2 percent slopes. Plainfield loamy fine sand, 2 to 6 percent slopes. Plainfield loamy fine sand, 2 to 6 percent slopes, eroded. Plainfield loamy fine sand, 6 to 12 percent slopes, eroded.	Excessively drained, deep, sandy soils on nearly level to undulating terraces along streams; the surface layer is very friable, granular loamy fine sand that grades to loose, single-grained, stratified sand with increasing depth.	20 feet or more
Ps	Plainfield loamy fine sand, loamy substrata variant.	Somewhat excessively drained, deep, sandy soils on nearly level terraces along streams; similar to the Plainfield loamy fine sands, but one or more layers of finer textured material occur within the loose sand 3 to 6 feet below the surface; these layers are loamy, silty, or clayey and are 1 to 6 inches thick.	20 feet or more

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
------------------	Moderate	Intermediate	3 to 6 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
Franconia sandstone	Moderate	Intermediate	Very deep	Slightly sticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.
Franconia sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
Franconia sandstone	Moderate	Intermediate	Very deep	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.
------------------	Moderate	Intermediate	3 to 5 feet	Nonsticky; nonplastic.	Slightly sticky; slightly plastic.	Slightly acid to neutral.
------------------	Moderate	High	Less than 1 foot.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Neutral to moderately alkaline.
------------------	Moderate	High	Less than 1 foot.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Neutral to moderately alkaline.
------------------	Very rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to strongly acid.
------------------	Rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to neutral.

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TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
RcA RcB RcC2	Richwood silt loam, 0 to 2 percent slopes. Richwood silt loam, 2 to 6 percent slopes. Richwood silt loam, 6 to 12 percent slopes, moderately eroded.	Well-drained, deep, silty soils on terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky, light silty clay loam; it overlies stratified silt and fine sand, which are at a depth below 42 inches.	20 feet or more__
Re	Riverwash.	Excessively drained, mixed, sandy and gravelly stream deposits on nearly level flood plains.	20 feet or more__
Ro	Rowley silt loam.	Somewhat poorly drained, deep, silty soil on nearly level terraces along streams; the surface layer is friable, granular silt loam; the subsoil is firm, blocky silty clay loam that overlies friable silt; fine sand occurs in places at a depth below 42 inches.	20 feet or more__
Sa	Sandy alluvial land, poorly drained.	Poorly drained, mixed, sandy materials on the nearly level flood plains of streams.	20 feet or more__
Sd	Sandy alluvial land.	Moderately well drained, mixed, sandy materials on the nearly level flood plains of streams.	20 feet or more__
SpA SpB SpB2 SpC SpC2	Sparta loamy fine sand, 0 to 2 percent slopes. Sparta loamy fine sand, 2 to 6 percent slopes. Sparta loamy fine sand, 2 to 6 percent slopes, eroded. Sparta loamy fine sand, 6 to 12 percent slopes. Sparta loamy fine sand, 6 to 12 percent slopes, eroded.	Excessively drained, deep, sandy soils on nearly level to undulating terraces along streams; the surface layer is a very friable loamy fine sand that grades to loose, single-grained, stratified sand with increasing depth.	20 feet or more__
Sr	Sparta loamy fine sand, loamy substrata variant.	Somewhat excessively drained, deep, sandy soil on nearly level terraces along streams; similar to the Sparta loamy fine sands, but it has one or more layers of finer textured material at a depth of 3 to 6 feet below the surface, within the loose sands; these layers are loamy, silty, or clayey and are 1 to 6 inches thick.	20 feet or more__
Ss	Sparta and Plainfield fine sands and Dune land.	Excessively drained, deep, sandy, undulating soils on terraces along streams.	20 feet or more__
St	Steep stony and rocky land.	Somewhat excessively drained, medium-textured, mixed soil material on steep valley slopes; many rock outcrops and scattered boulders.	1 to 5 feet______
TeA TeB	Tell silt loam, 0 to 2 percent slopes. Tell silt loam, 2 to 6 percent slopes.	Well-drained, silty soils, 2 to 3 feet thick, over sandy outwash on terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam; it overlies stratified, loose sand.	20 feet or more__
Tm	Terrace escarpments, loamy.	Well-drained to somewhat excessively drained loams on strongly sloping to steep terraces along streams.	20 feet or more__
Tn	Terrace escarpments, sandy.	Excessively drained, sandy soils on terraces; slopes range from 12 to more than 30 percent.	20 feet or more__
ToA ToB	Toddville silt loam, 0 to 2 percent slopes. Toddville silt loam, 2 to 6 percent slopes.	Moderately well drained, deep, silty soils on nearly level to gently sloping terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky silty clay loam; it overlies a friable, massive, silty substratum; in places stratified fine sand and silt are at a depth below 42 inches.	20 feet or more__
TrA TrB TrB2 TrC2	Trempe loamy fine sand, 0 to 2 percent slopes. Trempe loamy fine sand, 2 to 6 percent slopes. Trempe loamy fine sand, 2 to 6 percent slopes, eroded. Trempe loamy fine sand, 6 to 12 percent slopes, eroded.	Excessively drained, deep, reddish, sandy soils on nearly level to undulating terraces along streams; the surface layer is very friable loamy fine sand that grades to loose, single-grained, stratified sand with increasing depth.	20 feet or more__

See footnotes at end of table.

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
------------------	Moderate	Intermediate	More than 10 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to neutral.
------------------	Very rapid	High	1 to 5 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	
------------------	Moderate	Intermediate	2 to 4 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
------------------	Moderate to moderately rapid.	Intermediate	1 to 5 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
------------------	Moderate to moderately rapid.	Intermediate	5 to 10 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
------------------	Very rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Medium acid to slightly acid.
------------------	Rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.
------------------	Very rapid	High	More than 10 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to slightly acid.
Cambrian sandstone	Moderate	Intermediate	Very deep	------------------	------------------	Slightly acid to strongly acid.
------------------	Moderate	Intermediate	More than 10 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Slightly acid to strongly acid.
------------------	Moderate	Intermediate	Very deep	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to strongly acid.
------------------	Very rapid	High	Very deep	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to strongly acid.
------------------	Moderate	Intermediate	5 to 10 feet	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Slightly acid to strongly acid.
------------------	Very rapid	High	More than 5 feet.	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Strongly acid to medium acid.

TABLE 5.—*Brief description of the soils of Buffalo County*

Map symbol	Soil	Soil description	Depth to bedrock
UnE UnE2 UnF UnF2	Urne-Norden loams, 20 to 30 percent slopes. Urne-Norden loams, 20 to 30 percent slopes, moderately eroded. Urne-Norden loams, 30 to 40 percent slopes. Urne-Norden loams, 30 to 40 percent slopes, moderately eroded.	Very shallow to moderately deep, steep to very steep soils over greenish, fine-grained sandstone of the Franconia formation; the Urne soil has a friable, granular surface layer that rests on partially weathered, greenish, fine-grained sandstone; the Norden soil is described under the Norden loams.	1 to 3 feet
Wa	Wallkill silt loam.	Somewhat poorly drained, nearly level, silty alluvial soil; 18 to 42 inches thick over organic peat and muck; occurs on the flood plains of streams.	20 feet or more
WkA WkB	Waukegan silt loam, 0 to 2 percent slopes. Waukegan silt loam, 2 to 6 percent slopes.	Well-drained, silty soils, 24 to 42 inches thick over sandy outwash; occurs on terraces along streams; the surface layer is friable, granular silt loam; the subsoil is a firm, blocky, heavy silt loam; it is underlain by stratified, loose sand that in places contains a few pebbles.	20 feet or more

[1] The relative classes of soil permeability indicate estimated rate of movement of water, in inches per hour, through saturated, undisturbed cores under a ½-inch head of water. Terms used to describe permeability are—

Very slow	Less than 0.05	Moderately rapid	2.5 to 5.0
Slow	0.05 to 0.20	Rapid	5.0 to 10.0
Moderately slow	0.20 to 0.80	Very rapid	10.0 or more.
Moderate	0.80 to 2.50		

[2] The rate of infiltration (engineering application) describing the flow or movement of water through the soil surface into a nonsaturated soil. The terms used to describe the range of infiltration capacity through the profile of bare soils after 1 hour of continuous rainfall, are described as follows:

High	0.5+ inch per hour.	Low	Less than 0.10 inch per hour.
Intermediate	0.10 to 0.50+ inch per hour.		

(The above definition is according to R. E. HORTON, Amer. Soc. Civil Engin. Handbook. 1949.)

and estimates of properties significant to engineering—Continued

Geologic formation	Permeability of subsoil [1]	Infiltration rate [2]	Depth to water table [3]	Wet consistence		Reaction [4]
				Subsoil	Substratum	
Franconia sandstone			Very deep		Nonsticky; nonplastic.	Strongly acid to moderately alkaline.
	Moderate	Intermediate	2 to 3 feet	Nonsticky; nonplastic.	Nonsticky; nonplastic.	Slightly acid to neutral.
	Moderate	Intermediate	More than 10 feet.	Slightly sticky; slightly plastic.	Nonsticky; nonplastic.	Strongly acid to neutral.

[3] Refers to both seasonal and relatively stable high water tables. In some soils the water table is fairly constant at a given depth throughout the year; in others, the depth to the water table varies according to seasonal precipitation.

[4] Reaction refers to the acidity or alkalinity of the soil and is expressed in *pH;* that is, the logarithm of the reciprocal of the H-ion concentration. Terms used to describe reaction are—

	pH
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8

[5] Not determined or is variable.

TABLE 6.—*Estimated soil properties that affect engineering and*

Soil name [1] and mapping symbol	Erodibility hazard [2]		
	Surface layer	Subsoil	Substratum
Arenzville silt loam (Ar)	Moderate	Moderate	Moderate
Bertrand silt loam (BeA, BeB, BeB2, BeC, BeC2)	Moderate	Moderate	Moderate
Boone fine sand (BoB2, BoC2, BoD2)	Severe	Severe	(9)
Burkhardt sandy loam (BuA, BuB, BuC2)	Severe	Moderate	Severe
Chaseburg silt loam (CaA, CaB, CaC)	Moderate	Moderate	Moderate
Curran silt loam (Cu)	Moderate	Slight	Moderate
Dakota fine sandy loam (DaA, DaB, DaB2)	Moderate	Moderate	Severe
Dakota loam (DbA, DbB)	Moderate	Slight	Severe
Downs silt loam (DcB, DcB2, DcC2)	Moderate	Moderate	Moderate
Downs silt loam, benches (DdB, DdC2, DdD2)	Moderate	Moderate	Moderate
Dubuque silt loam (DeB, DeB2, DeC, DeC2, DeD, DeD2, DeE, DeE2, DeF2)	Moderate	Slight	Slight
Dubuque silt loam, deep (DpB, DpB2, DpC, DpC2, DpD, DpD2, DpE, DpE2)	Moderate	Moderate	Slight
Dubuque soils (DsC3, DsD3, DsE3, DuC3, DuD3)	Moderate	Slight	Slight
Duelm fine sandy loam (Dv)	Moderate	Moderate	Severe
Duelm fine sandy loam, high water table (Dw)	Moderate	Moderate	Severe
Ettrick silt loam (Es)	Moderate	Moderate	Moderate
Ettrick silt loam, sandy substratum (Et)	Moderate	Moderate	Severe
Fayette silt loam, uplands (FaB, FaB2, FaC, FaC2, FaC3, FaD, FaD2, FaD3, FaE, FaE2, FaE3).	Moderate	Moderate	Moderate
Fayette silt loam, valleys (FvB, FvC, FvC2, FvC3, FvD, FvD2, FvD3, FvE, FvE2, FvE3)	Moderate	Moderate	Moderate
Gale silt loam (GaB2, GaC2, GaC3, GaD, GaD2, GaD3, GaE, GaE2, GaE3)	Moderate	Moderate	Severe
Gotham loamy fine sand (GoA, GoB, GoB2)	Severe	Moderate	Severe
Granby sandy loam (Gr)	Moderate	Moderate	Severe
Granby fine sandy loam, stratified substratum variant (Gs)	Moderate	Moderate	Severe
Gullied land (Gu)	Severe	Severe	Severe
Hesch fine sandy loam (HcB, HcC2, HcD2, HcE, HcE2)	Moderate	Moderate	Severe
Hesch loam (HeC2, HeD2, HeE, HeE2)	Moderate	Moderate	Severe
Hixton fine sandy loam (HfB2, HfC2, HfC3, HfD, HfD2, HfD3)	Severe	Moderate	Severe
Hixton loam (HsB, HsB2, HsC, HsC2, HsC3, HsD, HsD2, HsD3)	Moderate	Moderate	Severe
Hixton loam and fine sandy loam (HtE, HtE2, HtE3, HtF, HtF2)	See description of soil properties of Hixton loam and of Hixton fine sandy loam.		
Hubbard soils (HuA, HuB)	Severe	Moderate	Severe
Huntsville silt loam (Hv)	Moderate	(9)	Moderate
Jackson silt loam (JaA, JaB, JaB2)	Moderate	Moderate	Moderate
Judson silt loam (JuA, JuB, JuC)	Moderate	Moderate	Moderate
Lindstrom silt loam LsC, LsC2, LsD2, LsE, LsE2)	Moderate	Moderate	Moderate
Loamy alluvial land (Lw)	Moderate	Moderate	Moderate
Loamy alluvial land, poorly drained (Lv)	Moderate	Moderate	Moderate
Marsh (Ma)	(9)	(9)	(9)
Medary silt loam (MdA, MdB2)	Moderate	Severe	Severe
Meridian fine sandy loam (MeA, MeB, MeB2, MeC2)	Severe	Moderate	Severe
Meridian loam (MmA, MmB, MmB2, MmC2)	Moderate	Moderate	Severe
Meridian loam, moderately well drained variant (MnA, MnB)	Moderate	Slight.	Severe
Norden fine sandy loam (NfB2, NfC2, NfD, NfD2, NfD3)	Severe	Moderate	(9)
Norden loam (NoC, NoC2, NoD2, NoE2)	Moderate	Moderate	(9)
Norden silt loam (GfC2, GfD, GfD2, GfD3, GfE, GfE2, GfE3)	Moderate	Moderate	(9)
Orion silt loam (Or)	Moderate	Moderate	Moderate

See footnotes at end of table.

estimated suitability of the soils for use in various kinds of construction

Suitability as a source of—					Suitability for—				Remarks
Topsoil [3]	Sand [4]	Fill material for earthen embankments [5]			Pond sites [6]	Drainage [7]	Irrigation [8]	Terraces or diversions	
		Surface soil	Subsoil	Substratum					
Good	Not suitable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	Subject to flooding.
Good	Questionable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	
Poor	Questionable	Good	(9)	(9)	Not suitable	----------	Poor	Not suitable	Droughty.
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Suitable	Droughty.
Good	Not suitable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	Subject to flooding.
Good	Not suitable	Fair	Fair	Fair	Questionable	Surface	(11)	Suitable	Subject to flooding.
Fair	Suitable	Good	Good	Good	Not suitable	----------	Good	Suitable	Droughty.
Good	Suitable	Good	Good	Good	Not suitable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Fair	Suitable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Fair	Suitable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Poor	Questionable	----------	Good	Questionable	
Good	Not suitable	Fair	Fair	Poor	Suitable	----------	Good	Suitable	
Fair	Not suitable	Fair	Poor	Poor	Questionable	----------	Fair	Questionable	
Fair	Suitable	Good	Good	Good	Questionable	Surface [10]	----------	Suitable	High water table.
Fair	Suitable	Fair	Good	Good	Suitable	Surface [10]	----------	Not suitable	High water table.
Good	Not suitable	Fair	Fair	Fair	Questionable	Subsurface	----------	Suitable	Subject to flooding.
Good	Not suitable	Fair	Fair	Fair	Questionable	Surface [10]	----------	Suitable	Subject to flooding.
Good	Not suitable	Fair	Fair	Fair	Suitable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Fair	Suitable	----------	Good	Suitable	
Good	Questionable	Fair	Fair	Good	Not suitable	----------	Good	Suitable	
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Good	Questionable	Good	Fair	Fair	Questionable	Surface [10]	----------	Suitable	Subject to flooding.
Poor	Not suitable	Good	Good	Fair	Questionable	Surface [10]	(11)	Suitable	
Poor	(9)	(9)	(9)	(9)	(9)	----------	(11)	Questionable	
Fair	Questionable	Good	Good	Good	Not suitable	----------	Fair	Questionable	Droughty.
Good	Questionable	Good	Good	Good	Not suitable	----------	Good	Suitable	
Poor	Questionable	Good	Good	Good	Not suitable	----------	Fair	Questionable	Droughty.
Good	Questionable	Good	Good	Good	Not suitable	----------	Good	Suitable	
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Good	Not suitable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	Subject to flooding.
Good	Not suitable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	Subject to flooding.
Good	Not suitable	Fair	Fair	Fair	Suitable	----------	Good	Suitable	
Good	Not suitable	Fair	(9)	Fair	Questionable	Surface	----------	Suitable	Subject to flooding.
Good	Not suitable	Fair	(9)	Fair	Questionable	Surface	----------	Suitable	Subject to flooding.
(9)	(9)	(9)	(9)	(9)	(9)	(9)	----------	Not suitable	Very high water table.
Good	Not suitable	Fair	Poor	Poor	Suitable	Surface	Fair	Suitable	
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Suitable	Droughty.
Good	Suitable	Good	Good	Good	Not suitable	----------	Good	Suitable	
Good	Questionable	Good	Good	Good	Not suitable	Surface	Good	Suitable	High water table.
Poor	Questionable	Good	Fair	Fair	Not suitable	----------	Good	Suitable	
Good	Questionable	Good	Fair	Fair	Not suitable	----------	Good	Suitable	
Good	Questionable	Fair	Fair	Fair	Not suitable	----------	Good	Suitable	
Good	Not suitable	Fair	Fair	Poor	Questionable	Subsurface.	----------	Suitable	Subject to flooding.

TABLE 6.—*Estimated soil properties that affect engineering and estimated*

Soil name [1] and mapping symbol	Erodibility hazard [2]		
	Surface layer	Subsoil	Substratum
Peat and Muck, shallow (Pa)	Severe [12]	Severe [12]	Moderate
Peat and Muck, deep (Pd)	Severe [12]	Severe [12]	Severe [12]
Plainfield loamy fine sand (PfA, PfB, PfB2, PfC2)	Severe	Severe	Severe
Plainfield loamy fine sand, loamy substrata variant (Ps)	Severe	Severe	Severe
Richwood silt loam (RcA, RcB, RcC2)	Moderate	Moderate	Moderate
Riverwash (Re)	Severe	Severe	(9)
Rowley silt loam (Ro)	Moderate	Moderate	Moderate
Sandy alluvial land (Sd)	Severe	Severe	Severe
Sandy alluvial land, poorly drained (Sa)	Severe	Severe	Severe
Sparta loamy fine sand (SpA, SpB, SpB2, SpC, SpC2)	Severe	Severe	Severe
Sparta loamy fine sand, loamy substrata variant (Sr)	Severe	Severe	Severe
Sparta and Plainfield fine sands and Dune land (Ss)	Severe	Severe	Severe
Steep stony and rocky land (St)	Moderate	Moderate	Moderate
Tell silt loam (TeA, TeB)	Moderate	Moderate	Severe
Terrace escarpments, loamy (Tm)	Moderate	Moderate	Severe
Terrace escarpments, sandy (Tn)	Severe	Severe	Severe
Toddville silt loam (ToA, ToB)	Moderate	Moderate	Moderate
Trempe loamy fine sand (TrA, TrB, TrB2, TrC2)	Severe	Severe	Severe
Urne-Norden loams (UnE, UnE2, UnF, UnF2)	Moderate	Severe	Severe
Wallkill silt loam (Wa)	Moderate	Moderate	Severe [12]
Waukegan silt loam (WkA, WkB)	Slight	Slight	Severe

[1] Soil types and miscellaneous land types mapped in the county; if a mapping unit is made up of two or more soils, the characteristics of both soils should be considered.

[2] The susceptibility of the soil materials to erosion by wind or water after the cover of plants has been removed.

[3] Ratings are for the use of the soil on embankments, on cut slopes, and in ditches to promote the growth of vegetation.

[4] Principally, the substratum, or material underlying the soil; does not indicate which deposits are suitable as a source of sand for use in concrete; includes particles that have a diameter ranging from 0.05 to 2.0 millimeters.

[5] Rating is for the use of the soil in embankments or for replacement of unsuitable material.

[6] Refers to the suitability of the soil material for construction of ponds for the permanent storage of water; the compactability of the soils and the porosity of the underlying material were both considered in this rating; questionable soils should be checked in the field.

suitability of the soils for use in various kinds of construction—Continued

Suitability as a source of—					Suitability for—				Remarks
Topsoil [3]	Sand [4]	Fill material for earthen embankments [5]: Surface soil	Fill material for earthen embankments [5]: Subsoil	Fill material for earthen embankments [5]: Substratum	Pond sites [6]	Drainage [7]	Irrigation [8]	Terraces or diversions	
Poor	Questionable	Not suitable.	Not suitable.	Good	Not suitable	Subsurface.	----------	Not suitable	Subject to flooding.
Poor	Not suitable	Not suitable.	Not suitable.	Not suitable.	Not suitable	Subsurface.	----------	Not suitable	Subject to flooding.
Poor	Suitable	Good	Good	Good	Not suitable	----------	Poor	Not suitable	Droughty.
Poor	Questionable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Good	Questionable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	
Poor	Suitable	Good	(9)	(9)	Not suitable	(9)	----------	Not suitable	Very droughty.
Good	Questionable	Fair	Fair	Fair	Questionable	Subsurface.	(11)	Suitable	Subject to flooding.
Poor	Not suitable	Fair	Fair	Fair	Not suitable	Surface	----------	Questionable	Subject to flooding.
Poor	Not suitable	Fair	(9)	Fair	Questionable	(9)	----------	Not suitable	Subject to flooding.
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Poor	Questionable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Poor	Suitable	Good	Good	Good	Not suitable	----------	Poor	Not suitable	Droughty.
Variable	Not suitable	Fair	(9)	(9)	Questionable	----------	----------	Not suitable	Stony.
Good	Suitable	Fair	Fair	Good	Not suitable	----------	Good	Suitable	
Good	Suitable	Good	Good	Good	Not suitable	----------	Good	Suitable	
Poor	Suitable	Good	Good	Good	Not suitable	----------	Poor	Not suitable	
Good	Questionable	Fair	Fair	Fair	Questionable	----------	Good	Suitable	
Poor	Suitable	Good	Good	Good	Not suitable	----------	Fair	Not suitable	Droughty.
Variable	Questionable	Fair	(9)	(9)	Not suitable	----------	Poor	Questionable	Variable in depth.
Good	Not suitable	Fair	Poor	Not suitable.	Not suitable	Subsurface.	----------	Suitable	Subject to flooding.
Good	Suitable	Fair	Fair	Good	Not suitable	----------	Good	Suitable	

[7] Rating concerns suitability for surface and subsurface drainage if needed; dashes imply that drainage is not needed.

[8] Rating refers to the suitability of the soils for irrigation, based chiefly on the moisture-holding capacity and rate of infiltration; it does not consider the economic feasibility of providing water for irrigation.

[9] Does not apply or is not suitable; lacks a B horizon, is underlain by bedrock or is extremely variable.

[10] Response to subsurface drainage is variable and is generally poor.

[11] Does not apply; soils are wet, exceedingly stony, or steep.

[12] When water table is lowered or soil is drained.

592930—62——6

TABLE 7.—*Engineering test data for soil*

Soil type and laboratory number	Depth	Moisture-density: Maximum dry density	Moisture-density: Optimum moisture	Mechanical analysis, percent passing sieve—: No. 10 (2.0 mm.)	Mechanical analysis, percent passing sieve—: No. 40 (0.42 mm.)
	Inches	*Lb. per cu. ft.*	*Percent*		
Bertrand silt loam:[3]					
Wis-2-46	0-7	----------	----------	100	97
Wis-2-49	20-40	----------	----------	100	99
Wis-2-50	40-54	----------	----------	100	99
Downs silt loam:[3]					
Wis-2-37	0-9	----------	----------	100	99
Wis-2-39	14-25	----------	----------	100	99
Wis-2-40	25-38	----------	----------	100	99
Dubuque silt loam:[3]					
Wis-2-18	0-5	----------	----------	100	99
Wis-2-20	10-15	----------	----------	100	99
Wis-2-22	24-30	----------	----------	100	99
Dubuque silt loam, deep phase:[3]					
C97	0-7	----------	----------	100	99
C99	14-23	----------	----------	100	99
C101	30+	----------	----------	100	89
Fayette silt loam:[4]					
S31386	0-11	103	17	----------	----------
S31387	26-33	105	19	----------	----------
S31388	48-60	107	18	----------	----------
Lindstrom silt loam:[3]					
3230235	0-16	----------	----------	100	96
3230237	25-40	----------	----------	100	96
3230238	40-60	----------	----------	100	97
Meridian sandy loam:[3]					
5574	0-8	----------	----------	100	80
5576	11-19	----------	----------	100	82
5578	28-34	----------	----------	100	73
Richwood silt loam:[3]					
5330	0-8	----------	----------	100	99
5334	23-30	----------	----------	100	99
5336	37-60	----------	----------	100	99
Sparta fine sand:[3]					
Wis-3-42	0-7	----------	----------	100	72
Wis-3-43	7-16	----------	----------	100	63
Wis-3-44	16-45	----------	----------	100	69

[1] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1, ed. 7): The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes, AASHO Designation: M 145-49(*1*). Classification estimated for the Bertrand, Downs, Dubuque, Lindstrom, Meridian, Richwood, and Sparta soils.

[2] Based on the Unified Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Expt. Sta. Corps of Engin., U.S. Army. March 1953(*7*). Classification estimated for the Bertrand, Downs, Dubuque, Lindstrom, Meridian, Richwood, and Sparta soils.

samples from nine profiles, Buffalo County, Wis.

Mechanical analysis—Continued						Liquid limit	Plasticity index	Classification	
Percent passing sieve—Continued		Percent smaller than—						AASHO [1]	Unified [2]
No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
96	91	90	50	18	12	20	4	A-4	ML-CL.
99	96	95	60	37	31	46	24	A-7-6	CL.
98	96	94	57	33	28	42	21	A-7-6	CL.
99	99	97	61	32	29	43	22	A-7-6	CL.
99	99	97	59	34	25	37	18	A-6	CL.
99	99	97	60	31	26	37	17	A-6	CL.
99	98	96	60	27	16	24	6	A-4	ML-CL.
99	99	98	74	51	39	58	32	A-7-6	CH.
98	97	96	89	71	55	76	43	A-7-5	CH.
99	98	94	63	20	13	20	4	A-4	ML-CL.
99	97	93	67	28	24	36	17	A-6	CL.
84	68	64	58	51	47	70	38	A-7-5	CH.
100	99	90	58	20	14	29	5	A-4(8)	ML-CL.
----------	100	97	64	36	30	44	20	A-7-6(13)	CL.
----------	100	96	60	30	25	38	16	A-6(10)	CL.
90	78	69	52	31	25	37	18	A-6	CL.
91	85	82	55	31	24	36	17	A-6	CL.
96	89	84	47	23	19	28	11	A-6	CL.
58	30	29	17	9	6	(5)	(5)	A-2-4	SM.
66	45	43	29	17	11	(6)	(6)	A-4	SM.
48	9	8	5	4	3	(5)	(5)	A-3	SP-SM.
99	95	93	50	22	16	24	6	A-4	ML-CL.
99	97	95	50	31	25	37	18	A-6	CL.
99	97	93	46	28	23	34	15	A-6	CL.
45	13	12	8	5	4	(5)	(5)	A-2-4	SM.
41	15	13	10	9	6	(5)	(5)	A-2-4	SM.
45	13	11	6	5	4	(5)	(5)	A-2-4	SM.

[3] Test data from U.S. Soil Conservation Service.
[4] Tests performed by U.S. Bureau of Public Roads in accordance with standard procedures of the AASHO.
[5] Nonplastic.
[6] Slightly plastic.

Crops

Hay crops, small grains, and corn are the three main crops grown in the county, but soybeans, wheat, rye, and peas for canning are also grown. Buckwheat and barley are grown on a small acreage. The following gives the acreage of the various crops in 1954:

Crop:	Acres
All tame hay	52,022
Alfalfa and alfalfa mixtures cut for hay	37,012
Clover and timothy cut for hay	10,778
Other tame hay	4,232
Corn for all purposes	38,328
Small grains threshed or combined:	
Oats	38,875
Barley	403
Rye	167
Wheat	638
Buckwheat	214
Soybeans for all purposes	4,417
Peas for canning	137
Irish potatoes harvested for home use or for sale	69

The principal hay crop is alfalfa-bromegrass. The acreage in alfalfa and alfalfa mixtures has increased greatly since 1945. Probably this increase has resulted partly because more lime became available about that time, and partly because agricultural programs encouraged farmers to seed land to legumes and grasses. The acreage in clover and timothy decreased as that of alfalfa and alfalfa mixtures increased. In 1954, only 10,778 acres was used to grow clover and timothy, as compared to 45,633 acres in 1945.

Oats are second in acreage only to hay crops. The acreage has decreased somewhat from the average acreage used for oats during the years between 1945 and 1949, but the yield per acre has increased substantially since that time.

Corn ranks third in acreage in the county. The acreage has increased slightly since 1944, and yields have increased.

The acreage in wheat reached an all-time peak in 1880, but it dropped rapidly after that date. In 1954, wheat was grown on only 638 acres.

Rye was once a fairly important crop, but the acreage has decreased. Barley was also important early in the century, but the acreage has declined greatly since that time.

Soybeans has been an important crop in recent years. Buffalo County is among the leading counties in the State in the acreage of soybeans grown.

Livestock and Livestock Products

In 1954, livestock and livestock products accounted for slightly more than 95 percent of the total income derived from the sale of farm products. Dairy products accounted for approximately 44.5 percent of the total sale of farm products; poultry and poultry products, for another 10.5 percent; and livestock other than dairy and poultry, mainly hogs and pigs, accounted for 40 percent.

The production of milk has increased greatly since 1940. In 1955, the annual average yield was 200 pounds more per cow than in 1950, and 1,600 pounds more than in 1940. More selective breeding, better feeding, and closer culling contributed to this increase.

Pasture

About 78,347 acres, or 19.8 percent of the total farmland in Buffalo County, was in pasture in 1954. This acreage consisted of cropland used for pasture and of areas other than woodland. In addition, 76,972 acres of woodland, or 19.4 percent of the total land area, was pastured.

Because, in recent years, emphasis has been on establishing better pastures, some of the wooded areas, formerly used for pasture, are now fenced and protected from fire and grazing. Yields of other pastures have been increased by renovating the areas. This practice consists of seeding steep areas to grasses and legumes but, at the same time, protecting them from severe erosion. When an area is renovated, the old sod is dug up with a field cultivator or similar implement until the turf is worked to a good seedbed. The residue that remains on the surface protects and binds the soil and helps to absorb runoff. After the seedbed is prepared, lime and fertilizer are applied in the kinds and amounts indicated by soil tests. Renovation is usually more successful if it is begun in fall prior to seeding than if it is delayed until later.

Many areas, too steep or eroded for continued use without being improved, have been brought back to profitable use by renovating them. This has helped to increase the returns from dairy products and has improved the areas for trees and wildlife. As the result of renovating, many farmers now have an acreage of permanent pasture large enough so that they no longer use their woodland for pasture. Consequently, the wooded areas and areas used for wildlife have improved.

Farm Tenure

Owners operated approximately 70 percent of the farms in the county in 1954. Tenants operated about 15 percent, and part owners, about 15 percent. Only 7 farms were operated by managers.

The proportion of farms operated by tenants was lower in 1954 than it had been since the early part of the century. From 1900 through 1945, the proportion of farms operated by tenants increased steadily as the value of farms increased. Many young farmers rented farms on a share or cash basis from farmers who were retiring. They waited to buy a farm until they could accumulate enough money. The high level of farm income during and after World War II made it possible for many more people to buy their farms.

Farm Expenditures

In 1954, the largest item of expense for most farmers in the county was feed for livestock. About 92 percent of the farmers reported that they had purchased feed. Approximately 86 percent of them reported expenditures for machine hire and for hired labor.

Purchases of commercial fertilizer and lime accounted for other expenditures on the farms. In 1954, approximately 68 percent of the farmers in the county used commercial fertilizer on their farms to supplement barnyard manure. Commercial fertilizer was used on about 74 percent of the corn acreage and on 33 percent of the oats acreage. Nearly all of the farmers use lime. Most of the lime is taken from two quarries located a few miles south of Mondovi.

Conservation Programs

The need to conserve natural resources has been strongly emphasized since the early 1930's. In 1933, a camp for employees of the Civilian Conservation Corps was located at Gilmanton. Workers from this camp completed a number of dams and planted trees to help control erosion. In 1940, the Buffalo County Soil Conservation District was organized to promote soil conservation.

The improvement of pastures, the practice of contour stripcropping, and the use of measures to conserve woodland have been the most widely used soil conservation practices. According to the 1958 report of the Buffalo Soil Conservation District, contour stripcropping is used on about 30 percent of the harvested cropland. Studies indicate that from 30 to 40 percent of the remaining cropland needs stripcropping and related practices to provide protection from erosion.

The improvement in pastures has helped in many other kinds of soil conservation farming. Because renovated pastures provide more forage than areas that have not been renovated, farmers who renovate their pastures can utilize the remaining less sloping land on their farms more efficiently for planting feed grains, silage, or cash crops. Grazing of woodlots, steep marginal lands, and swamps has decreased considerably in the county. As a result, the timber in woodlots has improved, wildlife areas provide more food and shelter for wildlife, and runoff and erosion are reduced. Aspen, birch, pin cherry, and other hardwoods have sprung up in woodlots that are protected from fire and grazing and now give good cover for wildlife. Deer and other game animals have increased.

Other practices used in the county to conserve the soils consist of establishing diversion ditches, constructing grassed waterways, planting trees, and improving the areas for wildlife. In addition, structures have been established in many places to control gullies. Special watershed programs and similar programs have helped bear the high cost of controlling gullies. Because much of the county is undulating or rolling, farms in the valleys are frequently damaged by flooding if gullies are not checked. In many places farmers have organized local watershed groups to help work out problems in soil conservation.

An increasing number of farmers are placing their farms under a complete soil conservation program. According to the 1957 report of the Buffalo County Soil Conservation District, 770 farms, or about 45 percent of the farms in Buffalo County, are operated under a soil conservation plan.

Information on the progress of soil conservation and on the amount of work that remains to be accomplished is contained in a Soil and Water Conservation Needs report that is available at the Buffalo County Soil Conservation District office at Alma.

Formation, Morphology, and Classification of Soils

In this section are discussed the factors that affect the formation of soils, the morphology and composition of the soils of Buffalo County, and the classification of the soils into higher categories. Following this discussion, each soil series in the county is described and a soil profile typical of that series is given.

Factors of Soil Formation

Soil is formed by weathering and other processes that act on the parent material. The characteristics of the soil at any given point depend upon (1) parent material, (2) climate, (3) living organisms, (4) relief, and (5) time or age.

Climate and living organisms are the active forces of soil formation. Climate, and its effect on soils and living organisms, is modified by the characteristics of the soil and by relief. Relief, in turn, strongly influences drainage, aeration, runoff, erosion, and exposure of the surface of the soil to sun and wind.

Parent material

The parent material of the soils in Buffalo County consists mainly of (1) material derived from the weathering of rocks in place, and (2) material transported by wind, water, or gravity and laid down as unconsolidated deposits of sand, silt, or clay. In addition, the parent material of a few soils is organic matter.

The county is in the northernmost part of the so-called Driftless Area, or unglaciated part of southwestern Wisconsin. Nevertheless, a small area in the uplands in the northwestern part of the county is shown on some geological maps as having been glaciated. In that part of the county, small, rounded, crystalline pebbles and small cobblestones underlie the loess on the ridgetops. The pebbles and cobblestones are too small, however, to have made it necessary for them to have been brought to their present location by glaciers. They, therefore, may represent a pre-Pleistocene deposit similar to the very old upland gravel of the Windrow formation. Regardless of the significance of these pebbles and cobblestones, however, they are too limited in quantity and in distribution to have influenced the formation of the soils appreciably.

The parent material derived from the weathering of rocks in place consists of material weathered from sedimentary rocks. Because sedimentary rocks differ greatly in chemical and mineralogical composition, the soils formed in material weathered from them also differ in characteristics. For example, some parent rocks are coarse textured. The soils formed in material weathered from these rocks are generally coarse textured. Other parent rocks are fine textured, and the soils formed in material weathered from them are fine textured.

The rocks from which the parent material of some of the soils was derived consist of Prairie du Chien dolomite of the Ordovician period and of Trempealeau, Franconia, and Dresbach sandstone of the upper Cambrian period. The Prairie du Chien dolomite may once have been a continuous surface formation. As the result of erosion, however, the limestone has been dissected deeply and has worn away. Now, there is only a remnant of this capping of limestone on the higher hills and ridges. Material weathered from limestone forms the lower part of the subsoil in the soils of the Dubuque series.

Material weathered from sandstone of the Dresbach and Trempealeau formations was the parent material of the

Hixton and Boone soils. The Norden and Urne soils, characterized primarily by the greenish hue in the lower part of the profile, formed principally in material weathered from thin-bedded Franconia sandstone that contained glauconite.

Of the materials transported by wind, water, or gravity, loess has been the most important in the formation of the soils of the county. Loess, thought to be of Peorian age (*4*), covers more than 60 percent of the county. It is wholly or in part the parent material of the soils in the area that it covers. The loess ranges in thickness from a few inches to as much as 15 feet. It is generally thickest on the nearly level parts of uplands, where it ranges in thickness from 30 to 100 inches. The Fayette and Downs soils formed in this thick layer of loess.

Peripheral to the areas of soils formed in deep loess, and in most places adjacent to the marginal breaks of Steep stony and rocky land, are the soils of the Gale and Dubuque series. The soils of these two series have formed in a moderately thick layer of loess—the Gale soils, in loess that overlies sandstone, and the Dubuque, in loess that overlies limestone. In some places materials weathered from sandstone form part of the profile of the Gale soils. The Dubuque soils, on the other hand, have in their profile a well-defined horizon of material weathered from limestone. Beyond the outer boundaries of the Gale and Dubuque soils, the loess thins out on the steeper slopes and in areas along streams where accelerated erosion has been active.

Although in this county loess has been the most important of the parent materials transported by wind, water, or gravity, a few of the soils have formed in colluvium or alluvium. Soils on stream terraces and on the flood plains of the present streams and rivers have formed in alluvium. The parent material of these soils was deposited originally as local alluvium washed from the uplands or as glaciofluvial material washed from the adjacent areas of glacial drift.

Where streams built a succession of terraces in the valleys, the higher terraces represent earlier deposits of alluvium, and the lower terraces, later ones. The age of the various terraces has been obscured, however, by the layer of loess that covers the older materials. Among the soils that are on these loess-covered alluvial terraces are the soils of the Bertrand, Medary, Jackson, and Meridian series.

Many of the older terraces have received no fresh deposits for centuries. In contrast, some of the more recent terraces, at lower elevations, are still receiving deposits of fresh material when streams overflow. On these more recent, lower lying terraces are the Sparta and Plainfield soils, which are classified as Regosols.

In addition to the areas where soils have formed in colluvium or alluvium, there is a broad area of low bottom lands in the north-central part of the county where the parent material of the soils consists primarily of sedges and grasses in various stages of decomposition. In this area organic soils, or peats and mucks, have formed.

Climate

Climate affects the soils, both directly and indirectly, and is an important factor of their formation. Climate expresses itself through the moisture (precipitation) and heat energy (temperature) it contributes to an environment.

The most important effect climate has on the formation of soils is the weathering of rocks and the altering of parent materials. The indirect effects, however, are often of equal or of even greater importance than the direct effects. For example, as an indirect effect, the content of clay tends to increase in the soils as the amount of precipitation increases and as temperature rises.

Climate also influences the formation of soils through its effect on living organisms, for which it supplies energy and a suitable environment. This is of special significance because it affects the fertility of the soils and the amount of organic matter that accumulates in them. In Buffalo County the effect of climate through its effect on living organisms is manifest in the Lindstrom soils, which are classified as Brunizem (Prairie) soils, and the Sparta soils, which are intergrading toward the Brunizem great soil group.

The formation of soils on extensive land areas, such as continents, is affected by general or macroclimatic conditions. In smaller areas, such as a county, however, variations in climate are much more limited, and, as a result, the effect of the climate on the formation of soils is more restricted.

In Buffalo County the effects of climate are modified somewhat by variations in relief. On the steep slopes in many parts of the county, more of the moisture from rainfall is lost through runoff than in areas where slopes are less steep. Consequently, in the steeper areas less moisture penetrates the soils to furnish moisture for plants, to support microbiological activity, and to cause rocks to weather and disintegrate than in the areas where slopes are milder. As a result, in the steep areas, biological, physical, and chemical agents of weathering are suppressed and the formation of soils is slowed.

On slopes facing south or west, the soils are warmed and dried by sun and wind more than the soils on slopes facing north or east. On slopes that face north or east, more moisture is retained and the temperature is somewhat cooler. Therefore, there is generally a denser growth of trees on the north- and east-facing slopes; more grass and sparser stands of trees grow on the warmer, less humid, south- and west-facing slopes.

Living organisms

Plants have been the principal living organisms to influence the formation of the soils in this county, but bacteria, fungi, earthworms, rodents, and man have also been important. Two of the chief functions of plant and animal life are to furnish organic matter and to bring plant nutrients from the lower part of the solum to the upper layers.

An example of the influence of vegetation on the characteristics of the soils can be seen in the contrast between the dark-colored Brunizem (Prairie) soils and the lighter colored Gray-Brown Podzolic soils formed under trees. Even though the soils of both great soil groups may have formed in the same kind of parent material, the presence of trees as the dominant vegetation in some areas and of grass in others has caused Gray-Brown Podzolic or Brunizem soils to form.

The greater amount of organic matter in the Brunizem soils, formed under grass, as compared to that in soils formed under trees is ascribed partly to the fact that soils formed under trees are generally more acid than soils formed under grass. This is because the relatively nonacid organic matter of grasslands is more stable than the more soluble, acid organic matter in soils formed under trees (*6*).

A further comparison shows that in the Gray-Brown Podzolic soils in this temperate zone less organic matter has accumulated than in the Brunizems. Also, more clay has accumulated in the B horizon of the Gray-Brown Podzolic soils, and those soils are more acid and have acquired a smaller proportion of exchangeable bases than the Brunizems. In areas where the vegetation was a mixture of trees and grasses, the characteristics of the soils are intermediate between those of the Gray-Brown Podzolic soils and of the Brunizems.

In areas that have been cultivated, man has been responsible for extensive changes in the soils. These changes consist of (1) altering the pH and fertility of acid soils by liming; (2) perpetuating grass by burning over areas that are normally wooded; (3) using improper cropping practices and thus causing organic matter to be lost; and (4) removing the cover of plants on terraces and uplands and thus causing accelerated erosion. Man has also changed the soils in many areas by changing the kind of vegetation growing on them. For example, he may have kept one field in permanent pasture and have used another for row crops. Eventually, though the soils in the two fields were originally similar in characteristics, their characteristics change because of the differences in the kind of vegetation growing on them.

The Arenzville soils are examples of soils formed as the result of changes made by man. In many places these soils have formed as the result of recent erosion in areas where the cover of plants was removed by man. Soil materials were washed from the silty soils on uplands and terraces, where the vegetation had been removed, and were deposited over areas of wet, dark-colored, recent alluvium on the flood plains of streams. The Arenzville soils formed in such transported materials that were deposited over older alluvium.

Relief

Relief influences the formation of soils by controlling drainage, runoff, and erosion. Differences in elevation or inequalities of the land surface in Buffalo County are closely related to differences in drainage, to differences in the thickness of the A horizon and in content of organic matter, to differences in the thickness of the solum, and to differences in the degree of horizon differentiation.

Drainage characteristics are usually reflected in the color of the soil and in the degree and kind of mottling or gleying in the soil profile. Of the well-drained soils, the Fayette, Downs, Dubuque, Norden, Gale, and Hixton soils are all on gently undulating to rolling uplands, and the Bertrand, Meridian, Tell, Dakota, Richwood, and Waukegan soils are on gently undulating to rolling terraces along streams. All of these soils are mottled in about the same way. All are free of mottling in the A and B horizons but are mottled in many places in the C horizon below a depth of several feet.

In contrast to the well drained soils, moderately well drained Jackson soils, on nearly level to gently undulating terraces along streams, have mottles in the lower part of the B horizon and in the C horizon. Also, the Rowley, Curran, and Orion soils, on nearly level terraces along streams, commonly have mottles in the lower part of the A horizon and in the B and C horizons below a depth of 6 to 16 inches. These soils are all somewhat poorly drained. The Rowley soils are Brunizems, but inasmuch as they have faint gleying immediately below the A_1 horizon, they are classified as intergrading toward the Low-Humic Gley great soil group.

The Granby soils, which are poorly drained, occupy level or concave areas on terraces along streams and are classified as Low-Humic Gley soils. The Ettrick soils, which are very poorly drained, occur on bottoms along streams and also occupy areas that are level or concave. They are classified as Humic Gley soils. The Low-Humic Gley and Humic Gley soils have very dark colored, organic-mineral surface horizons and are commonly strongly mottled or gleyed immediately below the dark surface layer.

The thickness of the surface layer and its content of organic matter are commonly related, directly or indirectly, to relief. The usual soil toposequence in Buffalo County consists of light-colored soils on the steeper slopes and of soils that have a successively darker and thicker surface layer in convex to concave areas and on the more gentle slopes. In areas that have mild slopes, runoff is slower and the soils absorb more moisture than on strong slopes. As a result, the content of moisture in soils that have mild slopes is more favorable for plants to grow and, consequently, for organic matter to accumulate.

In areas that have concave relief, the soils are likely to be waterlogged. Such areas are better suited to hydrophytic than to mesophytic plants, micro-organisms become less active or die and decompose, and the soils take on the characteristics of Low-Humic Gley or Humic Gley soils with their characteristic black A horizon. In very poorly drained areas, decomposing plant remains may accumulate to depths of several feet, and organic soils form.

Relief also affects the thickness of the solum and the degree of horizon differentiation. The soils that have steep slopes characteristically are shallow and lack horizon development. They are classified as Lithosols. As the gradient of the slope becomes milder, the solum of these soils becomes progressively thicker and the soils have a more clayey subsoil. The Urne and Norden soils are examples of this relationship. The soils of both series have formed in the same kind of parent material, but the Urne soils have strong slopes and a thin solum. They lack the textural and structural horizons that characterize the profile of the Norden soils.

Time or age

Time is required by the active agents of soil formation to form soils from parent material. Some soils form rapidly, others slowly. The length of time required for a particular kind of soil to form depends on the other factors involved.

When soils begin to form, the soil material has characteristics almost identical to those of the parent material and are said to be immature. Among such immature soils in Buffalo County are the Arenzville, Chaseburg, Huntsville, Judson, and Orion. These soils have little or no genetic differentiation between horizons, although there may be evident some inherited geological stratification. After a long period of time has passed, these soils will have gone through successive stages of soil development.

Generally, a soil may be said to be mature when it acquires well-developed profile characteristics and when it is nearly in equilibrium with its present environment. Not all soil components, however, mature at the same rate. Also, there is no reliable method for determining accurately when a soil is mature, or in equilibrium with its environment.

The ages of the original soils on the high terraces along streams are difficult to determine. This is because the material of various ages in the terraces has been covered by a mantle of loess, which conceals the ages of the underlying material. The alluvium underlying the older, loess-covered stream terraces is called old alluvium to distinguish it from alluvium deposited recently. Among the silty soils formed in loess overlying the older alluvium on terraces are the Bertrand, Jackson, Tell, Richwood, and Toddville soils. These soils have distinct horizons in their profiles. Among the soils on the lower lying terraces, where sandy deposits have been left more recently, are the Sparta and Plainfield soils in which genetic horizons are only weakly developed.

Morphology and Classification of Soils

One of the main objectives of a soil survey is to describe and identify the soils and to determine their relationship to agriculture. A second objective is to group the soils according to the characteristics they have in common. Such a grouping will show the relationship of the soils to one another and to soils of other areas. This is necessary because there are so many different kinds of soils that it would be difficult to remember the characteristics of all of them. If the soils are placed in a few groups, each group having selected characteristics in common, their general characteristics can be remembered more easily.

The lower categories of classification, the soil type and soil series, are defined in the Glossary at the end of the report. The soil phase, a subdivision of the soil series, is also defined.

Soil series are also grouped into higher categories—great soil groups and soil orders. These relationships are shown in table 8. All three soil orders—the zonal, intrazonal, and azonal—are represented in this county.

TABLE 8.—*Classification of the soils and major physiographic features*

ZONAL

Great soil group and soil series	Physiographic position	Relief	Internal drainage	Parent material
Gray-Brown Podzolic:				
Bertrand	Terraces along streams	Nearly level to sloping	Medium	Deep loess over old, sandy alluvium.
Curran (intergrading toward Low-Humic Gley soils).	Terraces along streams	Nearly level	Slow	Loess.
Downs (intergrading toward Brunizems).	Uplands and high terraces along streams.	Gently undulating to gently rolling.	Medium	Loess.
Dubuque	Uplands	Gently sloping to very steep	Medium	Loess over material weathered from limestone; limestone bedrock.
Fayette	Uplands and concave valley slopes.	Gently undulating to steep	Medium	Loess.
Gale	Uplands	Sloping to steep	Medium	Loess over sandstone.
Hixton	Uplands	Gently undulating to very steep.	Medium	Material weathered from sandstone.
Jackson	Terraces along streams	Nearly level to gently sloping.	Medium to slow.	Deep loess over old, sandy alluvium.
Medary	High terraces along streams	Nearly level to gently sloping.	Slow	Thin layer of loess over slackwater deposits of silt and clay.
Meridian	Terraces along streams	Nearly level to gently undulating.	Medium	Old, sandy alluvium.
Norden	Uplands	Sloping to steep	Medium	Franconia sandstone with a mantle of loess in places.
Tell	Terraces along streams	Nearly level to gently sloping.	Medium	Loess over old, sandy alluvium.
Brunizem (Prairie):				
Burkhardt	Terraces along streams	Nearly level to undulating	Rapid	Moderately coarse textured material over sandy and gravelly outwash.
Dakota	Terraces along streams	Nearly level to gently undulating.	Medium	Glaciofluvial and alluvial sands.
Duelm	Outwash plains and terraces along streams.	Level to nearly level	Slow	Glaciofluvial and alluvial sands.
Gotham (intergrading toward Gray-Brown Podzolic).	Outwash plains and terraces along streams.	Nearly level to gently undulating.	Rapid	Sandy alluvium.

TABLE 8.—*Classification of the soils and major physiographic features*—Continued

Great soil group and soil series	Physiographic position	Relief	Internal drainage	Parent material
ZONAL—Continued				
Brunizem (Prairie)—Con.				
Hesch	Uplands	Undulating to strongly sloping.	Medium	Material weathered from sandstone.
Hubbard	Outwash plains and terraces along streams.	Level to undulating	Rapid	Glaciofluvial and alluvial sands.
Lindstrom	Uplands and concave valley slopes.	Sloping to steep	Medium	Mainly loess but some material weathered from bedrock.
Richwood	Terraces along streams	Nearly level to sloping	Medium	Deep loess over old, sandy alluvium.
Rowley (intergrading toward Humic Gley soils).	Terraces along streams	Nearly level	Slow	Loess.
Toddville	Terraces along streams	Nearly level	Medium to slow.	Deep loess over old, sandy alluvium.
Trempe (intergrading toward Regosols).	Outwash plains and terraces along streams.	Nearly level to gently undulating.	Rapid	Coarse-textured material over reddish-brown, sandy alluvium.
Waukegan	Terraces along streams	Level to gently undulating	Medium	Loess over glaciofluvial and alluvial sands and gravel.
INTRAZONAL				
Humic Gley:				
Ettrick	Stream bottoms	Level to concave	Very slow; water table is near the surface most of the time.	Mixed, moderately coarse textured to medium-textured alluvium.
Granby	Terraces along streams	Level to concave	Very slow to slow.	Old, sandy alluvium.
AZONAL				
Alluvial:				
Arenzville	Flood plains of streams	Nearly level to gently sloping.	Medium	Silty alluvium that in many places overlies the surface layer of an old, buried soil formed in alluvium.
Chaseburg (intergrading toward Gray-Brown Podzolic soils).	Drainageways in uplands	Nearly level to gently sloping.	Medium	Thick deposits of local colluvium or alluvium washed from areas of Gray-Brown Podzolic soils.
Huntsville (intergrading toward Brunizems).	Stream bottoms	Nearly level	Medium	Silty alluvium.
Judson (intergrading toward Brunizems).	Drainageways in uplands	Nearly level to gently sloping.	Medium	Thick deposits of local colluvium or alluvium washed from areas of Prairie soils.
Orion	Flood plains of streams	Nearly level to very gently sloping.	Slow	Silty alluvium that in many places overlies an old, buried soil formed in alluvium.
Wallkill	Stream bottoms	Nearly level to concave	Very slow	Silty alluvium over grassy or sedgy peat or muck.
Lithosols:				
Urne	Uplands	Steep to very steep	Medium to rapid.	Material weathered from Franconia sandstone, in places with a thin capping of loess.
Regosols:				
Boone	Uplands	Gently sloping to very steep	Very rapid	Material weathered from sandstone over sandstone bedrock.
Plainfield	Outwash plains and terraces along streams.	Nearly level to gently undulating.	Very rapid	Glaciofluvial and alluvial sands.
Sparta (intergrading toward Brunizems).	Outwash plains and terraces along streams.	Nearly level to gently undulating.	Very rapid	Glaciofluvial and alluvial sands.

The zonal order is made up of soils that have well-developed profiles. The soils reflect the predominant influence of climate and living organisms in their formation. In Buffalo County the great soil groups of the zonal order are the Gray-Brown Podzolic and the Brunizem (Prairie).

Intrazonal soils have more or less well-defined characteristics that reflect the dominating influence of some local factor, such as relief or parent material, over the effects of climate and living organisms. In this county the only great soil group in the intrazonal order is the Humic Gley.

The azonal order is made up of soils that, because of youth, resistant parent material, or relief, lack well-developed profiles. The azonal soils in this county belong to the Alluvial, Lithosol, and Regosol great soil groups.

The great soil groups are described in the following pages, and the series in each group are listed. This classification is incomplete and may be revised as knowledge of the soils increases. The soils in several of the soil series are not representative of any one great soil group but intergrade from one great soil group to another. Each series represented in the county is described in the pages that follow the discussion of the great soil groups, and a representative profile is given for each.

Gray-Brown Podzolic soils

Gray-Brown Podzolic soils belong to the zonal order. They have a fairly thin covering of organic matter (A_0) and an organic-mineral (A_1) horizon. The organic-mineral horizon overlies a grayish-brown, leached A_2 horizon, which, in turn, rests upon a fine-textured (illuvial), brown B horizon. In Buffalo County the material underlying the Gray-Brown Podzolic soils consists of loessal or alluvial silt, clay, and sand and of sandstone and limestone.

The Gray-Brown Podzolic soils have formed under deciduous trees in a moist, temperate climate. The Bertrand, Dubuque, Fayette, Gale, Hixton, Jackson, Medary, Meridian, Norden, and Tell soils are in this great soil group. The Curran and Downs soils are also classified as Gray-Brown Podzolic soils, but the Curran soils are intergrading toward the Low-Humic Gley great soil group, and the Downs soils, toward the Brunizems.

Soils of the Gray-Brown Podzolic great soil group occupy most of the acreage in Buffalo County. Of these, the soils of the Fayette series are the most extensive, and soils of each of these series—the Hixton, Gale, Dubuque, Norden, and Bertrand—occupy a slightly smaller acreage. In addition to the major soils, there is a smaller acreage of Jackson, Curran, Downs, Medary, Meridian, and Tell soils.

The Gray-Brown Podzolic soils in the county differ from one another primarily because of differences in the parent material and in relief. The parent material weathered from a number of different kinds of rocks and minerals. It was altered largely as the result of differences in relief, which influenced drainage, horizon differentiation, the thickness of the solum, and the depth of the accumulation of organic matter.

The Fayette soils, typical of the Gray-Brown Podzolic soils in the county, are gently undulating to rolling and have formed in loess of Peorian age. They formed in a layer of loess, 42 inches or more thick, on ridges in the uplands and on valley slopes. The ridge slopes are generally between 5 and 20 percent, and the valley slopes, between 12 and 30 percent.

The Fayette soils are well drained, but in places in the more nearly level areas the C horizon is slightly mottled. In most places the A_0 horizon and parts of the A_1 and A_2 horizons have been mixed together by plowing. Consequently, the present surface layer is generally called an A_p horizon and is slightly higher in color value than the original A_1.

The Dubuque, Gale, and Downs soils are associated with the Fayette soils. These soils all formed wholly or mainly in loess, but the Dubuque and Gale soils formed in a thinner mantle of loess than the Fayette soils, or in a mantle of loess less than 42 inches thick. The Downs soils formed in a thick layer of loess. They have a thicker and darker A_1 horizon than the Dubuque and Gale soils. In the Dubuque and Downs soils, the loess overlies weathered limestone, and, in the Gale soils, it overlies weathered sandstone. The lower part of the solum in the Dubuque soils and in many places in the Gale soils formed in materials weathered from the underlying bedrock.

The Hixton and Norden soils differ from the other soils of uplands in having formed in material weathered from sandstone of Cambrian age rather than from loess or from other silty material. The Hixton soils formed in material weathered from yellowish-brown or buff-colored Trempealeau or Dresbach sandstone. The Norden soils formed in material weathered from Franconia (glauconitic) sandstone. The Franconia sandstone is a greenish color and is finer textured than the Trempealeau and Dresbach sandstones. The finer grain of the parent rock causes the Norden soils to be finer textured than the Hixton soils. As a result, the Norden soils have higher moisture-holding capacity than the Hixton soils.

The Bertrand, Jackson, Curran, Meridian, Tell, and Medary soils are examples of Gray-Brown Podzolic soils formed on terraces. The Bertrand, Jackson, and Curran soils formed in a layer of silt 42 inches or more thick. The Meridian and Tell soils formed in a layer of silty or loamy materials 20 to 42 inches thick over sand. The Medary soils differ from the other soils on terraces in that the upper part of the solum formed in a thin layer of silt and the rest of the solum formed from the underlying reddish-brown, lacustrine clay.

The Curran and Downs soils are not true Gray-Brown Podzolic soils. The Curran soils, which have somewhat poor drainage instead of being well drained like the other Gray-Brown Podzolic soils, intergrade toward the Low-Humic Gley great soil group. The Downs soils, formed in a grassland-forest transitional belt, intergrade toward Brunizems.

Brunizem (Prairie) soils

The Brunizems, or Prairie, soils belong to the zonal order. They have formed in a temperate, humid climate under a cover of tall grasses dominated by bluestems (*Andropogon* spp.). Typically, the Brunizems that have not been cultivated have a thick, very dark brown to black A horizon. This soil material grades through a dark yellowish-brown B horizon to the lighter colored parent material below. After the soils have been cultivated, the surface layer may be slightly lighter colored and slightly thinner than it was before.

The parent material of the Brunizem soils in this county, like the parent material of the Gray-Brown Podzolic soils, consists of loessal and alluvial silts and sands or of materials weathered from sandstone.

The term "Prairie soils," once used to designate Brunizems, does not apply to all dark-colored soils of the treeless plains, but only to those in which carbonates have not been concentrated in any part of the profile by soil-forming processes. The B horizon in most of the Brunizems contains slightly higher concentrations of clay than the horizons in the rest of the profile. The Burkhardt, Dakota, Duelm, Gotham, Hesch, Hubbard, Lindstrom, Richwood, Rowley, Toddville, Trempe, and Waukegan soils are in this great soil group.

The Richwood, Lindstrom, Waukegan, Dakota, Toddville, and Rowley soils are the most extensive of the soils in this great soil group, and the Burkhardt, Trempe, Hubbard, Duelm, Gotham, and Hesch soils occupy a smaller acreage.

Except for the Lindstrom and Hesch soils, all of these soils are on terraces. The Lindstrom soils are on valley slopes, and the Hesch soils, at slightly higher elevations in the uplands. This is in distinct contrast to the Gray-Brown Podzolic soils, which are about equally distributed between valley terraces and uplands.

The Lindstrom soils are somewhat similar to the Fayette soils of the Gray-Brown Podzolic great soil group, and the Hesch soils are somewhat similar to the Hixton. The Lindstrom soils have formed on concave valley slopes in a layer of silt that was thicker than 42 inches. They lie below dolomite or sandstone ridges. The Hesch soils formed in material weathered from Cambrian sandstone.

The Richwood soils, which are somewhat like the Bertrand soils of the Gray-Brown Podzolic great soil group, formed in a layer of silt that was more than 42 inches thick. The Richwood soils, like their catenary associates, the Toddville and Rowley soils, occur on terraces that overlie old, sandy alluvium. The Richwood soils are well drained, the Toddville soils, moderately well drained, and the Rowley soils, somewhat poorly drained.

The Waukegan soils are somewhat similar to the Tell soils of the Gray-Brown Podzolic great soil group. They formed in a thinner layer of silt than the Richwood soils, or in silt that was 24 to 42 inches thick.

The Dakota soils, which are somewhat similar to the Meridian soils of the Gray-Brown Podzolic great soil group, formed on terraces in a layer of medium-textured material, 24 to 42 inches thick over sandy outwash. The Burkhardt soils, associated with the Dakota soils, formed in a somewhat thinner layer of moderately coarse textured material that was 10 to 24 inches thick over sandy and gravelly outwash.

The Hubbard soils formed in sandy outwash on low stream terraces. They differ from the Sparta soils of the Regosol great soil group in having a weak textural B horizon and finer textured material in the solum.

The Duelm soils are moderately well drained to poorly drained Brunizems. They occur in association with the Dakota, Burkhardt, and Hubbard soils.

The Trempe soils have an AC profile with poorly defined horizons. They are not true Brunizems but are intergrades toward the Regosol great soil group. Like the Trempe soils, the Gotham and Rowley soils are not true Brunizems but are intergrades to other great soil groups. The Gotham soils are intergrading toward the Gray-Brown Podzolic great soil group, and the Rowley soils, toward the Humic Gley great soil group.

Humic Gley soils

The Humic Gley soils (formerly called Wiesenböden or Half Bog soils) belong to the intrazonal order. They have formed in depressions where natural drainage is poor to very poor. Their surface layer is dark colored and contains a large amount of organic matter. In most places it is more than 6 inches thick. The subsoil is strongly gleyed and is mottled. These soils lack an A_2 horizon. The texture of the different horizons differs little throughout the solum.

In Buffalo County the Ettrick and Granby series are in the Humic Gley great soil group. The Ettrick soils are very poorly drained. They formed in silty materials on the high bottoms of alluvial flood plains.

The soils of the Granby series are somewhat poorly drained to poorly drained. They occur in level to concave areas on terraces along streams.

Alluvial soils

The Alluvial soils belong to the azonal order. These soils are young. They are forming in material recently deposited on flood plains and on alluvial fans and in draws. The soils are subject to flooding. Fresh materials are deposited on them when floodwaters are high. As a result, the soil materials have not been in place long enough for distinct horizons to have developed in the profiles. In Buffalo County the Arenzville, Chaseburg, Huntsville, Judson, Orion, and Wallkill soils are in this great soil group.

The Arenzville and Orion soils are typical of the soils in the Alluvial great soil group. The Arenzville soils are well drained and occur in association with the Orion soils, which are somewhat poorly drained. The soils of both series are forming in thick, silty alluvium that in many places overlies the profile of an older, buried alluvial soil.

The Chaseburg and Judson soils formed in thick deposits of local alluvium or colluvium in drainageways in the uplands. Because in many places they have weakly developed profiles, however, they are considered to be intergrades to other great soil groups. The Chaseburg soils are intergrading toward the Gray-Brown Podzolic great soil group, and the Judson soils, toward the Brunizem great soil group.

The Wallkill soils have formed in recent, light-colored alluvial materials that overlie grassy or sedgy peat or muck. The soils are on bottoms along streams in areas that are nearly level or concave.

The Huntsville soils have formed in deep silts that washed down from soils on the uplands and terraces and were deposited on the nearly level bottoms below. The soils are dark colored to a depth of about 36 inches and are moderately well drained to well drained. They are intergrading toward the Brunizem great soil group.

Lithosols

The Lithosols belong to the azonal order. Typically, they are shallow and have little or no profile development.

The soils are made up largely of partly weathered fragments of rock or nearly bare rock.

In Buffalo County the Urne soils are classified as Lithosols. These soils are shallow and are underlain by greenish, shaly sandstone. They are mainly on steep knobs below areas of Steep stony and rocky land and have slopes of 20 to 40 percent.

Regosols

Regosols belong to the azonal order. They are forming in thick, unconsolidated, sandy deposits or in a moderately thick layer of sandy material weathered from sandstone. The profiles of the Regosols show only weak development. In this county the Boone, Plainfield, and Sparta soils are classified as Regosols.

The Boone soils occur on uplands and have formed in sandy material weathered from sandstone. The Plainfield and Sparta soils formed in glaciofluvial and alluvial sands. The Sparta soils are intergrading toward Brunizems.

Unclassified

Organic soils and miscellaneous land types are not classified into higher categories. The organic soils, or Peats and Mucks, have formed in organic matter consisting of the decomposing remains of plants. They occur in depressions in flood plains and terraces, where drainage is very poor, and they vary in thickness over mineral soil materials. The description given in the section "Detailed Descriptions of Soil Profiles" is typical of the majority of Peats and Mucks in the county. In some wet areas, however, the plant remains near the surface may be less decomposed than in the profile described.

Miscellaneous land types are areas of land that have little or no true soil. They also include areas that were inaccessible so that they could not be examined carefully and other areas where it was not feasible to identify the soils nor to classify them by soil series. Such areas are named primarily in terms of landform and, secondarily, in terms of material. In Buffalo County seven kinds of miscellaneous land types are mapped. They are (1) Alluvial lands, (2) Gullied land, (3) Marsh, (4) Riverwash, (5) Steep stony and rocky land, (6) Terrace escarpments, and (7) Dune land.

Detailed Descriptions of Soil Profiles

In this section the soil series are discussed and a representative profile is given for each. The great soil group is given for each series for easy cross-reference to table 8.

Arenzville series

The Arenzville series consists of well drained to moderately well drained soils of the Alluvial great soil group. The soils have developed in silty alluvium that commonly overlies an older, dark, buried alluvial soil. They occur on bottoms along streams. The soils are closely associated with the Orion soils but are better drained. They are nearly neutral in reaction.

The Arenzville soils have mottles in the lower part of the profile. In many places thin layers of coarse silt and of very fine sand occur at varying intervals throughout the profile. The color of these soils varies somewhat from place to place, depending upon the color of the sediments that were deposited.

Profile of an Arenzville silt loam (NE¼NE¼ sec. 23, T. 23 N., R. 13 W.):

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam with very narrow streaks of yellowish brown (10YR 5/4) and very dark grayish brown (10YR 3/2); weak, medium, granular structure; very friable; neutral; abrupt, smooth boundary.

C_1 8 to 13 inches, brown (10YR 5/3) silt loam; a few, fine, faint mottles of yellowish brown (10YR 5/4) in lower part; thin layers of very fine sand are scattered throughout this layer; weak, thin, platy structure; very friable; slightly acid; abrupt, smooth boundary.

C_2 13 to 22 inches, thin layers of dark-gray (10YR 4/1) and gray (10YR 5/1) silt loam; a few, medium, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4) in lower part; weak, thin, platy structure; weak, fine, subangular blocky structure developing in lower 6 inches; very friable; slightly acid; abrupt, smooth boundary.

A_{11b} 22 to 34 inches, black (N 2/0) silt loam; high in organic matter; common, fine, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4); weak, thick, platy structure; very friable; slightly acid; clear, smooth boundary.

A_{12b} 34 to 40 inches, very dark gray (10YR 3/1) silt loam; high in organic matter but contains less organic matter than horizon just above; common, fine, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4); weak, thick, platy structure; very friable; slightly acid; clear, smooth boundary.

C 40 inches +, dark grayish-brown (2.5Y 4/2) silt loam; common, medium, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4); moderate, very fine, subangular blocky structure; friable; slightly acid.

Bertrand series

The Bertrand series consists of well-drained soils developed in a deep layer of silt. The soils belong to the Gray-Brown Podzolic great soil group. They occur on stream terraces in association with moderately well drained Jackson and somewhat poorly drained Curran soils. The Bertrand soils are similar to the Tell soils, but they have sand at varying depths below 42 inches. In contrast, the Tell soils have sand at a depth of about 30 inches. The Bertrand soils occur throughout the county in areas where silty soils of the upland predominate.

Profile of a Bertrand silt loam (SW¼SW¼ sec. 27, T. 21 N., R. 11 W.):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; roots abundant; neutral; clear, smooth boundary.

A_2 8 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, thick, platy structure in places, but breaks readily to moderate, fine, subangular blocky structure; very friable; roots abundant; slightly acid; clear, smooth boundary.

B_1 10 to 13 inches, dark-brown (10YR 4/3) silt loam; moderate, thick, platy structure breaking to moderate, fine, subangular blocky structure: friable; a few light-gray (10YR 7/2) silica coatings; roots plentiful; medium acid; clear, smooth boundary.

B_{21} 13 to 20 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium and fine, subangular blocky structure with dark-brown (10YR 3/3) clay films and light-gray (10YR 7/2) silica coatings on the aggregates; roots plentiful; strongly acid; clear, smooth boundary.

B_{22} 20 to 36 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure with dark-brown (10YR 3/3) clay films and light-gray (10YR 7/2) silica coatings on the aggregates; firm when moist and slightly hard when dry; roots plentiful; strongly acid; clear, smooth boundary.

B_3 36 to 42 inches, dark yellowish-brown (10YR 4/4), light silty clay loam; weak, coarse, subangular blocky structure with light-gray (10YR 7/2) silica coatings on the aggregates; friable; roots few; strongly acid.

C 42 inches +, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) silt; massive; friable; strongly acid.

Boone series

The Boone series consists of excessively drained soils developed in materials from St. Peter sandstone or sandstone of Cambrian age. The soils belong to the Regosol great soil group. They developed under forest on gently sloping to very steep uplands. The Boone soils are associated with the Norden and Gale soils. They are also closely associated with the Hixton soils, but they differ from those soils in lacking a textural B horizon. The Boone soils have rapid internal drainage. As a result, they are droughty.

Profile of a Boone loamy fine sand (SE¼SE¼ sec. 12, T. 24 N., R. 10 W.):

A_{00} and A_0 ¾ to 0 inch of partly decomposed, matted oak leaves and stems of bluegrass.

A_{11} 0 to 2 inches, very dark brown (10YR 2/2) loamy fine sand; weak, fine, granular structure; very friable; grass roots abundant; strongly acid; clear, smooth boundary.

A_{12} 2 to 4 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) loamy fine sand; weak, fine, granular structure; very friable; roots of trees and grasses plentiful; strongly acid; clear, smooth boundary.

A_3 4 to 8 inches, dark yellowish-brown (10YR 3/4) loamy fine sand with very dark grayish-brown (10YR 3/2) coatings on the aggregates; weak, medium, subangular blocky structure; very friable; tree roots plentiful; strongly acid; clear, wavy boundary.

C_1 8 to 20 inches, dark yellowish-brown (10YR 4/4) fine sand; single grain; loose; in places streaked or stained very dark grayish brown (10YR 3/2) with organic matter; a few tree roots; strongly acid; clear, wavy boundary.

C_2 20 to 38 inches, dark yellowish-brown (10YR 4/4) fine sand; single grain; loose; a few tree roots; strongly acid; gradual, smooth boundary.

C_3 38 to 46 inches, yellowish-brown (10YR 5/6) to light yellowish-brown (10YR 6/4) fine sand; single grain; loose; medium acid; gradual, smooth boundary.

C_4 46 inches +, yellowish-brown (10YR 5/6) to light yellowish-brown (10YR 6/4) sands that gradually merge with unweathered sandstone bedrock.

Burkhardt series

The Burkhardt series consists of somewhat excessively drained soils of the Brunizem great soil group. In this county these soils are mainly on terraces along the Mississippi River, near Buffalo City and Cochrane. They occur in association with Sparta, Hubbard, Duelm, and Dakota soils.

The Burkhardt soils are similar to the Sparta and Hubbard soils, but the Sparta and Hubbard soils have less fine material in the solum. The Burkhardt soils are also similar to the Duelm soils, but the Duelm soils are moderately well drained to somewhat poorly drained. The Burkhardt soils are shallower and somewhat coarser textured than the Dakota soils.

Profile of a Burkhardt sandy loam (SW¼NW¼ sec. 32, T. 21 N., R. 12 W.):

A_p 0 to 12 inches, black (10YR 2/1) sandy loam; weak, medium, subangular blocky structure that breaks to weak, medium, granular; very friable; abundant roots; medium acid; clear, smooth boundary.

B_2 12 to 18 inches, very dark brown (7.5YR 2/2) sandy loam; weak, medium, subangular blocky structure; very friable; plentiful roots; medium acid; clear, smooth boundary.

B_3 18 to 24 inches, dark-brown (7.5YR 3/2) loamy sand that contains a few pebbles; weak, medium, subangular blocky structure; very friable; medium acid; clear, smooth boundary.

C_1 24 to 30 inches, dark-brown (7.5YR 3/4) coarse sand and gravel, and multicolored sands that contain a large proportion of dark-colored minerals; single grain; loose; medium acid; gradual, smooth boundary.

C_2 30 inches +, brown (7.5YR 5/4) coarse sand and gravel, and multicolored sands that contain a large proportion of dark-colored minerals; single grain; loose; medium acid.

Chaseburg series

The Chaseburg series consists of deep, well-drained, silty soils of the Alluvial great soil group. The soils have formed in alluvial materials. The parent materials were deposited in draws and on foot slopes by surface creep and by runoff from upland areas.

These soils do not have a well-developed profile. They occur in positions similar to those occupied by the Judson soils, but they are lighter colored than the Judson soils. The soils are widely distributed throughout the county. Nearly all of the areas are small.

The color of the materials in which these soils formed varies slightly. In some areas there are thin layers of fine sand throughout the profile. The risk of flooding varies between slight and moderate.

Profile of a Chaseburg silt loam (NW¼SE¼SW¼ sec. 19, T. 24 N., R. 11 W.):

A_{11} 0 to 24 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; very friable; abundant roots; neutral; gradual, smooth boundary.

A_{12} 24 to 32 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, platy structure; friable; roots plentiful; slightly acid; gradual, smooth boundary.

C_1 32 to 42 inches, dark-brown (10YR 4/3) silt loam; weak, medium, platy structure; friable; roots plentiful; slightly acid; gradual, smooth boundary.

C_2 42 inches +, yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure; friable; medium acid.

Curran series

The Curran series consists of deep, silty, somewhat poorly drained soils on terraces. The soils developed under timber in a thick deposit of loess. They are Gray-Brown Podzolic soils but are intergrading toward the Low-Humic Gley great soil group. The soils are nearly level. They occur in close association with the Bertrand and Jackson soils, but are not so well drained as those soils. The Curran soils have only fair surface drainage and slow internal drainage.

Only one Curran soil, Curran silt loam, occurs in Buffalo County. In this soil the color of the surface layer ranges from dark gray to very dark grayish brown. The subsoil also varies in color, and in texture it ranges from heavy silt loam to silty clay loam. In many places mottling is so pronounced in this soil that the base color is difficult to identify. The subsoil and the substratum range from medium acid to strongly acid.

Profile of a Curran silt loam (SE¼NE¼ sec. 11, T. 21 N., R. 12 W.):

A_p 0 to 8 inches, dark-gray (10YR 4/1) to very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular to weak, fine, subangular blocky structure; very friable; abundant roots; neutral; abrupt, smooth boundary.

A_2 8 to 15 inches, brown (10YR 5/3) to grayish-brown (10YR 5/2) silt loam; common, fine, distinct mottles of dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6); weak, thin to medium, platy structure; light-gray (10YR 7/2) silt between the plates; very friable; moderately vesicular; strongly acid; abrupt, smooth boundary.

B_{2g} 15 to 25 inches, dark-brown (7.5YR 4/4 or 10YR 4/3) to pale-brown (10YR 6/3), heavy silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/8); stains of iron and manganese; moderate, thick, platy macrostructure that breaks to weak, fine, subangular blocky structure; moderately vesicular; vertical faces of peds thickly coated with light-gray (10YR 7/1) silt; friable; roots common; strongly acid; gradual smooth boundary.

B_{3g} 25 to 32 inches, dark-brown (7.5YR 4/4 or 10YR 4/3) to pale-brown (10YR 6/3) silt loam; dark stains of iron and manganese and many, medium, prominent mottles of yellowish brown (10YR 5/8); weak, coarse, subangular blocks that break to weak, thick plates; thick coats of light-gray (10YR 7/1) silt on vertical faces of peds; friable; strongly acid; gradual, smooth boundary.

C_g 32 inches +, grayish-brown (2.5Y 5/2) silt loam; many, fine, prominent mottles of dark brown (7.5YR 4/4) and dark stains of iron and manganese; massive; friable; medium acid.

Dakota series

The Dakota series consists of moderately deep, well-drained soils underlain by loose sands. The soils developed under prairie grasses in loamy or sandy outwash. In this county they occur on terraces near the Buffalo, Chippewa, and Mississippi Rivers. These soils are in the Brunizem great soil group.

Dakota loams and Dakota fine sandy loams occur in the same general areas. They are associated with the Sparta, Hubbard, Burkhardt, Waukegan, and Duelm soils. The Dakota soils are finer textured than the Sparta, Hubbard, and Burkhardt soils; their solum is less silty than that of the Waukegan soils; and their drainage is better than that of the Duelm soils. The Dakota soils are somewhat similar to the Meridian soils in texture and in the thickness of their solum, but their A horizon is thicker and darker.

The solum of the Dakota soils ranges from 24 to 36 inches in thickness. The size of the particles of sand underlying the soils also varies. In some places small pebbles are mixed with the sand.

Profile of a Dakota loam (SW¼SE¼ sec. 8, T. 20 N., R. 12 W.):

A_p 0 to 10 inches, very dark brown (10YR 2/2) loam; moderate, medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

B_1 10 to 14 inches, dark-brown (10YR 3/3) loam; weak, medium, subangular blocky structure; friable; slightly acid; plentiful roots; clear, smooth boundary.

B_2 14 to 28 inches, dark-brown (10YR 4/3 to 3/3), heavy loam; moderate, medium, subangular blocky structure; firm, slightly hard when dry; roots plentiful; medium acid; clear, smooth boundary.

B_3 28 to 32 inches, dark-brown (10YR 4/3) fine sandy loam; weak, medium, subangular blocky structure; very friable; plentiful roots; medium acid; gradual, wavy boundary.

C 32 inches +, dark yellowish-brown (10YR 4/4) medium sand; structureless (single grain); loose; medium acid.

Profile of a Dakota fine sandy loam (NE¼NW¼ sec. 22, T. 23 N., R. 11 W.):

A_1 0 to 10 inches, very dark brown (10YR 2/2) fine sandy loam; moderate, medium, granular structure; very friable; abundant roots; neutral; clear, wavy boundary.

A_3 10 to 14 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, subangular blocky structure that breaks to moderate, medium, granular structure; very friable; roots plentiful; neutral; abrupt, smooth boundary.

B_1 14 to 16 inches dark-brown (10YR 3/3) fine sandy loam; weak, medium, subangular blocky structure; friable; roots plentiful; neutral; clear, wavy boundary.

B_2 16 to 25 inches, dark-brown (10YR 4/3), light loam; moderate, subangular blocky structure; friable; slightly hard when dry; plentiful roots; strongly acid; diffuse, wavy boundary.

B_3 25 to 36 inches, dark-brown (10YR 4/3) fine sandy loam; weak, medium, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

C_1 36 to 50 inches, yellowish-brown (10YR 5/4) loamy sand; single grain; loose; medium acid; gradual, smooth boundary.

C_2 50 to 60 inches, yellowish-brown (10YR 5/4) medium sand; single grain; loose; slightly acid; gradual, smooth boundary.

C_3 60 to 80 inches, yellowish-brown (10YR 5/4) medium sand with bands of loamy sand; single grain; loose; neutral.

Downs series

The Downs series consists of deep soils that are well drained and silty. The soils belong to the Gray-Brown Podzolic great soil group but are intergrading toward Brunizems. They formed mainly under prairie grasses, but partly under a thin stand of trees.

The normal Downs silt loams are gently undulating to rolling and occur on broad upland ridges that are capped with loess. They occur in association with the Fayette and deep Dubuque soils, but they have a darker, somewhat thicker A horizon than those soils. The normal Downs silt loams in Buffalo County are mainly on Alma Ridge.

The Downs soils on benches occur at a level below the Fayette and Lindstrom soils of the upland valley slopes. They are on terraces that are higher than normal stream terraces. The soils formed in loess, underlain by laminated silts deposited by streams. The silts overlie calcareous, fine-grained, glauconitic sandstone of the Franconia formation. The profile of the Downs silt loams on benches is similar to that of the normal Downs silt loams, but the normal Downs silt loams formed in loess underlain by dolomitic limestone.

Profile of a Downs silt loam (SE¼NE¼ sec. 18, T. 21 N., R. 12 W.):

A_p 0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; abundant roots; neutral; abrupt, smooth boundary.

A_2 9 to 12 inches, brown (10YR 5/3) silt loam; moderate, medium, platy structure; light-gray (10YR 7/2) coatings of silt on surfaces of peds; moderately vesicular; very friable; roots plentiful; neutral; clear, smooth boundary.

B_1 12 to 16 inches, dark-brown (10YR 4/3) silt loam; weak, thick, platy macrostructure that breaks to moderate, fine, subangular blocky structure; light-gray (10YR 7/2) coatings of silt on surfaces of peds; moderately vesicular; friable; roots plentiful; medium acid; clear, wavy boundary.

B_{21} 16 to 23 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; moderately vesicular; light-gray (10YR 7/2) coatings of silt on surfaces of peds; firm; medium acid; clear, wavy boundary.

B_{22} 23 to 32 inches, dark yellowish-brown (10YR 3/4) silty clay loam; moderate, medium, subangular blocky structure; light-gray (10YR 7/2) silica coatings on surfaces of peds; slightly vesicular; firm; few roots; strongly acid; clear, wavy boundary.

B_3 32 to 38 inches, dark yellowish-brown (10YR 3/4), light silty clay loam; weak, medium, subangular blocky structure; light-gray (10YR 7/2) coatings on surfaces of peds; slightly vesicular; firm; few roots; strongly acid; gradual, irregular boundary.

C 38 inches +, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; several feet thick over limestone; medium acid.

Profile of a Downs silt loam, bench phase (NW¼NE¼ sec. 13, T. 24 N., R. 12 W.):

A_p 0 to 8 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) silt loam; weak, medium to fine, granular structure; very friable; abundant roots; slightly acid; clear, smooth boundary.

A_2 8 to 13 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, thin to medium, platy structure; very friable; plentiful roots; medium acid; clear, wavy boundary.

B_{11} 13 to 17 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure; friable; plentiful roots; strongly acid; clear, smooth boundary.

B_{12} 17 to 21 inches, dark-brown (10YR 4/3) silt loam; weak, fine to medium, subangular blocky structure; moderately vesicular; friable; plentiful roots; strongly acid; abrupt, smooth boundary.

B_2 21 to 36 inches, dark-brown (10YR 3/3 to 10YR 4/3), light silty clay loam; weak, thick, platy macrostructure that breaks to moderate, fine, subangular blocky structure; firm; moderately vesicular; plentiful roots; strongly acid; clear, wavy boundary.

B_3 36 to 40 inches, dark-brown (10YR 4/3) silt loam; weak, thick, platy macrostructure that breaks to weak, fine, subangular blocky structure; moderately vesicular; friable; medium acid; clear, wavy boundary.

C_1 40 to 52 inches, brown (10YR 4/3) silt; massive; very vesicular; slightly acid.

C_2 52 to 120 inches, pale-brown (10YR 6/3) silt with thin bands of strong-brown (7.5YR 5/8) silt; massive; very friable; slightly acid.

D 120 inches +, greenish, fine-grained, glauconitic sandstone that is partially weathered.

Dubuque series

The Dubuque series consists of silty, well-drained upland soils of the Gray-Brown Podzolic great soil group. The soils have formed partly in loess of Peorian age and partly in cherty red clay that has weathered from Prairie du Chien dolomite. Depth to clay in the normal Dubuque silt loams ranges from 12 to 20 inches. In the Dubuque silt loams, deep, the clay is at a depth of 20 to 42 inches.

The normal Dubuque silt loams occur on rounded, loess-capped ridges in association with Dubuque silt loams, deep, and with Fayette silt loams, They are generally along the lower edges of the ridges, where the mantle of loess is thinnest. The Dubuque silt loams, deep, and the Fayette soils are on the milder slopes above areas of normal Dubuque silt loams.

Dubuque silt loams, deep, are similar to the normal Dubuque silt loams, but they have formed in a thicker layer of loess and have a somewhat thicker B horizon. They are also similar to the Fayette silt loams, but the lower part of the subsoil and the substratum are red clay. In contrast, the substratum of the Fayette soils is made up of loess, or silty materials. The Dubuque silt loams, deep, vary chiefly in depth to red clay, in the amount of chert in the clay, and in the depth of clay over dolomite.

In places the Dubuque soils are severely eroded and tillage has mixed part of the clay from the subsoil with the remaining surface layer. In some of these areas, the texture of the present surface layer is silt loam, and in others it is silty clay loam.

Profile of a Dubuque silt loam (NW¼NE¼ sec. 11, T. 22 N., R. 11 W.):

A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular and weak, fine, subangular blocky structure; friable; abundant roots; neutral; clear, smooth boundary.

A_2 6 to 13 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, thin, platy structure; very friable; plentiful roots; slightly acid; clear, wavy boundary.

B_1 13 to 18 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4), heavy silt loam; weak, thin, platy structure; very friable; plentiful roots; strongly acid; abrupt, smooth boundary.

B_2 18 to 28 inches, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/8) clay; strong, fine, subangular blocky structure; very hard when dry, plastic when wet; few roots; strongly acid; clear, smooth boundary.

C 28 to 36 inches, reddish-brown (5YR 4/4) to yellowish-red (5YR 4/6) clay; massive to coarse, angular blocky structure; very hard when dry, plastic when wet; few roots; strongly acid; clear, smooth boundary.

D 36 inches +, broken limestone.

Profile of a Dubuque silt loam, deep phase (SE¼ SE¼ sec. 22, T. 22 N., R. 13 W.):

A_0 1½ to 0 inch, black (10YR 2/1), loose mat of decomposed residue from oak trees.

A_1 0 to 1 inch, black (10YR 2/1) silt loam; moderate, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_{21} 1 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, thin, platy structure; very friable; plentiful roots; slightly acid; clear, smooth boundary.

A_{22} 4 to 9 inches, brown (10YR 5/3) silt loam; moderate, thick, platy structure; finely vesicular; very friable; plentiful roots; slightly acid; abrupt, smooth boundary.

B_1 9 to 12 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, subangular blocky structure; finely vesicular; light-gray (10YR 7/1) coatings on peds; friable; plentiful roots; medium acid; clear, smooth boundary.

B_2 12 to 26 inches, dark-brown (10YR 4/3) silty clay loam; strong, fine to medium, angular blocky structure; very vesicular; firm; few roots; strongly acid; gradual, smooth boundary.

B_3 26 to 32 inches, dark-brown (7.5YR 4/4) silty clay loam; strong, coarse, subangular blocky structure; firm; strongly acid; few roots; abrupt, smooth boundary.

C 32 to 42 inches, reddish-brown (5YR 4/3) clay; massive to weak, coarse, angular blocky structure; very hard when dry, plastic when wet; few roots; strongly acid; accumulations of iron and manganese; gradual, smooth boundary.

D 42 inches +, unweathered dolomitic limestone.

Duelm series

The Duelm series consists of moderately well drained to somewhat poorly drained soils developed under prairie. The soils are on stream terraces. Nearly all of the areas are on the terrace along the Mississippi River near Cochrane. The soils belong to the Brunizem great soil group. They are underlain by stratified sand.

The Duelm soils are closely associated with the Dakota soils. They occur in lower positions on the terraces than the Dakota soils and have a more poorly drained subsoil. The imperfect drainage in the subsoil is attributed to seepage from the Mississippi River. The height of the water table and the degree of wetness in the subsoil vary as the result of differences in the level of the water in the river.

In these soils the color of the surface layer ranges from very dark brown to very dark grayish brown, and the intensity of mottling and depth to mottling varies. The texture of the subsoil ranges from fine sandy loam to loam. Depth of the soil materials over loose sand is generally between 26 and 32 inches but ranges from 24 to 42 inches. In places the sand contains a few small pebbles.

Profile of a Duelm fine sandy loam (NW¼NW¼ sec. 8, T. 20 N., R. 12 W.):

A_1 0 to 12 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable; abundant roots; neutral; gradual, smooth boundary.

B_2 12 to 26 inches, dark-brown (10YR 3/3), heavy fine sandy loam; weak, medium, subangular blocky structure; friable; plentiful roots; medium acid; gradual, smooth boundary.

B_3 26 to 36 inches, dark grayish-brown (10YR 4/2) loamy fine sand; a few, fine, faint mottles of yellowish brown (10YR 5/8); medium, subangular blocky structure; friable; plentiful roots; medium acid; gradual, smooth boundary.

C 36 inches +, dark-brown (10YR 4/3) medium and fine sand; few, fine, faint mottles of yellowish brown (10YR 5/8); single grain; loose; medium acid.

Profile of a Duelm fine sandy loam, high water table (SE¼SW¼ sec. 5, T. 20 N., R. 12 W.):

A_1 0 to 10 inches, black (10YR 2/1) to very dark gray (10YR 3/1) mucky fine sandy loam; weak, medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

B_{21g} 10 to 15 inches, dark-gray (10YR 4/1) sandy clay loam to fine sandy loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) to dark brown (7.5YR 4/4); weak, fine, subangular blocky structure; slightly hard when dry, and slightly sticky when wet; abundant roots; slightly acid; clear, smooth boundary.

B_{22g} 15 to 26 inches, dark grayish-brown (10YR 4/2) to dark-gray (10YR 4/1) sandy clay loam to fine sandy loam; many, medium, distinct mottles of dark brown (7.5YR 4/4) to strong brown (7.5YR 5/6); weak, medium to coarse, subangular blocky structure; slightly hard when dry, and slightly sticky when wet; slightly acid; gradual, smooth boundary.

B_{3g} 26 to 29 inches, grayish-brown (10YR 5/2), light sandy loam; many, medium, distinct mottles of dark brown (7.5YR 4/4) to strong brown (7.5YR 5/6); weak, coarse, subangular blocky structure; nonsticky; neutral; clear, smooth boundary.

C_g 29 inches +, grayish-brown (10YR 5/2) coarse sand; many, medium, distinct mottles of dark brown (7.5YR 4/4) to strong brown (7.5YR 5/6); single grain; nonsticky; neutral.

Profile of a Duelm loam (SW¼SE¼ sec. 1, T. 20 N., R. 12 W.):

A_1 0 to 10 inches, very dark brown (10YR 2/2) loam; a few, fine, faint mottles of yellowish brown (10YR 5/8); weak, fine, subangular blocky structure; friable; abundant roots; slightly acid; clear, smooth boundary.

A_3 10 to 18 inches, dark grayish-brown (10YR 4/2) loam to sandy clay loam; common, medium, distinct mottles of dark reddish brown (5YR 3/4); firm, but slightly hard when dry; plentiful roots; medium acid; gradual, smooth boundary.

B_2 18 to 26 inches, mottled grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and dark reddish-brown (5YR 3/4) loam to fine sandy loam with no base color; weak, medium, subangular blocky structure; firm, but slightly hard when dry; plentiful roots; strongly acid; gradual, smooth boundary.

B_3 26 to 42 inches, light brownish-gray (10YR 6/2), brown (10YR 5/3), and dark reddish-brown (5YR 3/4) sandy loam; weak, medium, subangular blocky structure; very friable; few roots; strongly acid; gradual, smooth boundary.

C 42 inches +, highly mottled, saturated coarse sands; strongly acid.

Ettrick series

The Ettrick series consists of dark-colored, very poorly drained soils in the valleys of streams. The soils belong to the Humic Gley great soil group. They have developed in silty alluvium washed from medium- and fine-textured soils of nearby uplands and terraces. The soil materials have been in place long enough so that the profile has developed to a depth of 36 inches or more. The soils are flooded frequently. The vegetation under which they developed consisted of water-tolerant grasses, sedges, and trees.

These soils occur in association with the Wallkill soils. They are also associated with Peats and Mucks and with other soils of the bottom lands, including areas of poorly drained alluvial lands.

The principal variations in these soils consist of differences in the thickness of the surface layer. Some areas are covered by a layer, several inches thick, of mucky material from plant remains. Others are covered by a thin layer of light-colored, silty overwash, which is as much as 18 inches thick in places. The soils range from neutral to mildly alkaline in reaction.

Some of the Ettrick soils are underlain by weakly stratified silts and fine sands. In the sandy substratum phase, the silty clay loam that has definite structure does not extend to a depth so great as in the normal Ettrick soils. Strata of fine sand may be present anywhere within the C horizon.

Profile of an Ettrick silt loam (NW¼NW¼ sec. 19, T. 22 N., R. 10 W.):

A_p 0 to 8 inches, very dark gray (10YR 3/1) to dark gray (10YR 4/1) silt loam; common, fine, distinct mottles of dark reddish brown (5YR 3/4); moderate, medium, platy structure; friable; abundant roots; neutral; gradual, smooth boundary.

A_{12} 8 to 14 inches, black (N 2/0) silt loam; common, fine, distinct mottles of dark reddish brown (5YR 3/4); weak, thick, platy macrostructure that breaks to moderate, fine, subangular blocky structure; friable; abundant roots; neutral; gradual, smooth boundary.

AC 14 to 24 inches, dark-gray (10YR 4/1), heavy silt loam; common, fine, distinct mottles of dark reddish brown (5YR 3/4); friable; few roots; neutral; gradual, smooth boundary.

C_1 24 to 31 inches, gray (2.5Y 5/1) silty clay loam; many, large, prominent mottles of dark reddish brown (5YR 3/4); moderate, medium to fine, subangular blocky structure; firm; few roots, neutral; gradual, smooth boundary.

C_2 31 to 42 inches, light olive-gray (5Y 6/2) silty clay loam; common, medium, distinct mottles of dark reddish brown (5YR 3/4); weak, medium, subangular blocky structure to massive; firm; few roots; neutral; gradual, smooth boundary.

C_3 42 inches +, light olive-gray (5Y 6/2) silty clay loam; common, medium, distinct mottles of dark reddish brown (5YR 3/4); massive; firm; neutral.

Profile of an Ettrick silt loam, sandy substratum (SW¼SW¼ sec. 30, T. 24 N., R. 12 W.):

A_p 0 to 8 inches, black (10YR 2/1 or 2.5Y 2/1) silt loam; massive in the upper part but moderate, fine and medium, granular in lower part; friable; contains large amount of organic matter; roots abundant; neutral; abrupt, smooth boundary.

A_1 8 to 15 inches, black (10YR 2/1 or 2.5Y 2/1) silty clay loam; moderate, fine, subangular blocky structure; friable; roots abundant; neutral; clear, smooth boundary.

C_1 15 to 36 inches, dark-gray (5Y 4/1) to gray (5Y 5/1) silty clay loam; massive to weak, medium, subangular blocky structure; firm, but slightly hard when dry; few roots; neutral; clear, wavy boundary.

C_2 36 inches +, gray (5Y 5/1) coarse silts and fine sands; massive; friable; no roots observed; weakly stratified; neutral.

Fayette series

The Fayette series consists of deep, well-drained soils of the Gray-Brown Podzolic great soil group. The soils have formed in deep deposits of loess of Peorian age. They have fairly uniform characteristics.

Fayette silt loams, uplands, occur on broad ridgetops in association with Downs silt loams and with Dubuque silt loams, deep. They are somewhat similar to the Downs soils, but in many places they have a thinner, lighter colored A_1 horizon, a lighter colored A_2 horizon that has a more platy structure, and a somewhat better developed B horizon with a finer subangular blocky structure. The Fayette silt loams, uplands, formed in a deeper layer of silt than that in which the Dubuque soils developed.

Fayette silt loams, valleys, are similar to the upland Fayette silt loams, except that the surface soil is gritty in places, and, in a few areas, the texture of the surface layer is loam or fine sandy loam. Also, they have less well-developed horizons. The soils are closely associated with Norden and Urne soils. They occur in narrow bands below areas of Steep stony and rocky land. Differences in the texture of the surface layer appear to have been caused by differences in the colluvial materials that washed or sloughed down onto these soils from the areas of Steep stony and rocky land above.

Fayette silt loams, uplands, occur throughout the uplands in Buffalo County, but they are less extensive in the northern part. Fayette silt loams, valleys, occur throughout all parts of the county.

Representative profile of a Fayette silt loam on an upland ridgetop (SW¼SW¼ sec. 23, T. 23 N., R. 12 W.):

A_p 0 to 7 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; abundant roots; slightly acid; abrupt, smooth boundary.

A_2 7 to 9 inches, grayish-brown (10YR 5/2) silt loam; light-gray (10YR 7/2) silica coatings on peds; weak, thin, platy structure; friable; plentiful roots; slightly acid; clear, smooth boundary.

B_1 9 to 13 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure in place, but breaks to very fine subangular blocky structure when disturbed; firm; roots plentiful; medium acid; clear, smooth boundary.

B_{21} 13 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, dark specks; strong, fine, angular blocky structure; dark yellowish-brown clay skins; firm; plentiful roots; strongly acid; clear, smooth boundary.

B_{22} 21 to 30 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) silty clay loam; a few, fine, dark specks; strong, medium, subangular blocky structure; clay skins less prominent than in B_{21} horizon; firm; plentiful roots; strongly acid; clear, smooth boundary.

B_3 30 to 38 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, distinct mottles of yellowish brown (10YR 5/8); moderate, coarse, subangular blocky structure; friable; few roots; strongly acid; gradual, smooth boundary.

C 38 inches +, yellowish-brown (10YR 5/4) silt loam; massive; strongly acid; few roots.

Representative profile of a Fayette silt loam on a valley slope (SW¼NE¼ sec. 27, T. 23 N., R. 13 W.):

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) silt loam; weak, fine to medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_2 7 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; weak, thin, platy structure; dark yellowish-brown (10YR 3/4) clay skins and light-gray (10YR 7/2) coatings of silt on the peds; moderately vesicular; weak, thin, platy structure; very friable; abundant roots; neutral; clear, wavy boundary.

B_1 11 to 19 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam; moderate, medium to fine, subangular blocky structure; dark yellowish-brown (10YR 3/4) clay skins and light-gray (10YR 7/2) coatings of silt on the peds; moderately vesicular; friable; plentiful roots; slightly acid; clear, smooth boundary.

B_2 19 to 32 inches, dark yellowish-brown (10YR 4/4), light silty clay loam; moderate, medium, subangular blocky structure; dark yellowish-brown (10YR 3/4) clay skins and light-gray (10YR 7/2) coatings of silt on the peds; moderately vesicular; friable; plentiful roots; strongly acid; clear, smooth boundary.

B_3 32 to 42 inches, dark yellowish-brown (10YR 4/4), light silty clay loam; moderate, coarse, subangular blocky structure; friable; plentiful roots; strongly acid; clear, gradual boundary.

C 42 inches +, dark grayish-brown (10YR 4/2) silt loam; massive; very friable; strongly acid.

Gale series

The Gale series is made up of well-drained, silty soils developed in loess. St. Peter sandstone or sandstone of Cambrian age underlies the loess. The soils are in the Gray-Brown Podzolic great soil group. They are associated with Hixton, Norden, Boone, deep Dubuque, and deep Fayette soils. The Gale soils are similar to the Hixton soils, but they have silty A and B horizons. They are also somewhat similar to the Norden soils, but the Norden soils are underlain by fine-grained, glauconitic sandstone.

The solum of the Gale soils varies chiefly in thickness. It ranges from 24 to 42 inches in thickness, but it is commonly 24 to 36 inches thick. In some places the B_3 horizon formed in materials weathered from the underlying sandstone and has a loam texture.

Profile of a Gale silt loam (SW¼SW¼ sec. 24, T. 22 N., R. 11 W.):

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, subangular blocky structure in place, but breaks readily to moderate, fine granules; friable; roots abundant; medium acid; 6 to 8 inches thick; abrupt, smooth boundary.

A_2 7 to 13 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) silt loam; moderate, medium to thin, platy structure; friable; roots plentiful; medium acid; clear, wavy boundary.

B_1 13 to 18 inches, dark-brown (10YR 4/3), heavy silt loam; weak to moderate, fine to medium, subangular blocky structure; friable; a few grayish-brown (10YR 5/2) silica coatings on peds; roots plentiful; medium acid; clear, wavy boundary.

B_2 18 to 28 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine to medium, subangular blocky structure; firm, but slightly hard when dry; a few, grayish-brown (10YR 5/2) silica coatings on peds; roots plentiful; strongly acid; clear, wavy boundary.

B_3 28 to 31 inches, dark yellowish-brown (10YR 4/4), gritty silty clay loam; moderate, medium, subangular blocky structure; blocks have dark-brown (10YR 3/3) coatings and a few grayish-brown (10YR 5/2) silica coatings; firm, but slightly hard when dry; roots plentiful; strongly acid; clear, wavy boundary.

D 31 inches +, partly weathered sandstone that ranges in color from white (10YR 8/2) to yellow (10YR 7/8); massive in place, but breaks to single grain; no roots; strongly acid.

Gotham series

The Gotham soils are sandy and are somewhat excessively drained. They occur on outwash plains and on the terraces of streams. The soils are Brunizems, but they have some characteristics similar to those of soils in the Gray-Brown Podzolic great soil group. The parent material is largely quartz sand, but it contains a small amount of darker colored minerals. In many places the soils have layers of finer textured materials, ranging from 1 to 6 inches in thickness, at a depth of 3 to 6 feet.

The soils have a thicker, darker colored A_1 horizon than the Plainfield soils and a thinner, lighter colored A_1 horizon than the Sparta soils. They have a weakly developed B horizon and differ from soils of both the Plainfield and Sparta series in this respect. Their surface layer is lighter colored than that of the Hubbard soils.

The Gotham soils vary chiefly in the texture and thickness of the B horizon. The texture of that horizon ranges from loamy fine sand to sandy loam, and the thickness, from 10 to 30 inches.

Profile of a Gotham loamy fine sand:

A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) loamy fine sand; weak, fine, granular structure; very friable, abundant roots; medium acid; clear, smooth boundary.

A_3 10 to 14 inches, dark-brown (10YR 4/3) loamy fine sand; weak, medium, subangular blocky structure; very friable; plentiful roots; strongly acid; gradual, wavy boundary.

B_2 14 to 22 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; weak, coarse to medium, subangular blocky structure; very friable; plentiful roots; strongly acid; gradual, smooth boundary.

B_3 22 to 30 inches, yellowish-brown (10YR 5/4) loamy fine sand; weak, coarse, subangular blocky structure; very friable; plentiful roots; strongly acid; gradual, smooth boundary.

C 30 inches +, yellowish-brown (10YR 5/4) to light yellowish-brown (10YR 6/4) sand; single grain; loose; strongly acid.

Granby series

The Granby series consists of somewhat poorly drained to poorly drained soils that overlie stratified sands. The soils belong to the Humic Gley great soil group. They occur in depressions or in nearly level areas on stream terraces. The soils are subject to overflow and ponding. Typically, they occur in small, low-lying areas in association with the Meridian soils, but they are not so well drained as the Meridian soils. In places they have thin strata of silt in the substratum, and, in a few places, weathered sandstone is at a depth below 36 inches. In this county the Granby soils are more acid than the typical Granby soils.

In Buffalo County a stratified substratum variant is mapped with the Granby series. This soil developed in stratified, medium- to coarse-textured materials and has alternate bands of loam to silty clay loam in the substratum. It occurs on low, broad terraces in the valley of Bear Creek in the northern part of the county. It is also on high stream benches west of Urne. This soil is medium acid to slightly acid if it has not been limed.

Profile of a Granby loam (SE¼NW¼ sec. 25, T. 23 N., R. 10 W.):

A_p 0 to 9 inches, very dark grayish-brown (10YR 3/2) to very dark brown (10YR 2/2) loam; moderate, medium to fine, subangular blocky structure; friable; abundant roots; medium acid; clear, smooth boundary.

A_2 9 to 13 inches, very dark grayish-brown (10YR 3/2) loam; many, fine, distinct mottles of dark reddish brown (5YR 3/4); moderate, thin, platy structure; friable; few roots; strongly acid; clear, wavy boundary.

C_{1g} 13 to 25 inches, light brownish-gray (2.5Y 6/2) loam; many, medium, distinct mottles of dark brown (7.5YR 4/4); moderate, thin, platy structure; friable; few roots; strongly acid; clear, wavy boundary.

C_2 25 to 28 inches, gray (5Y 6/1) sandy loam; weak, thick, platy structure; friable; a few fragments of sandstone; strongly acid; gradual, smooth boundary.

C_3 28 inches +, light brownish-gray (2.5Y 6/2) fine sand; a few fragments of sandstone; single grain; loose; strongly acid.

Profile of a Granby fine sandy loam (stratified substratum variant) (NW¼NE¼ sec. 3, T. 23 N., R. 13 W.):

A_p 0 to 8 inches, very dark gray (10YR 3/1) to very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, subangular blocky to medium, fine, granular structure; friable; plant roots abundant; neutral; abrupt, smooth boundary.

A_{21} 8 to 14 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, platy structure; friable; vesicular; roots plentiful; slightly acid; clear, smooth boundary.

A_{22} 14 to 21 inches, yellowish-brown (10YR 5/4) to light yellowish-brown (10YR 6/4) fine sandy loam; common, medium, distinct mottles of yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/4); weak, thick, platy structure; very friable; roots plentiful; medium acid; clear, wavy boundary.

A_{23} 21 to 25 inches, yellowish-brown (10YR 5/4) fine sandy loam; many, medium, distinct mottles of yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/4); weak, thick, platy structure; friable; roots plentiful; medium acid; clear, smooth boundary.

B_{2g} 25 to 31 inches, grayish-brown (2.5Y 5/2) to light brownish-gray (2.5Y 6/2) sandy clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/4); weak, thick, platy to moderate, medium, subangular blocky structure; firm; few roots; slightly acid; clear, wavy boundary.

B_3 31 to 40 inches, yellowish-brown (10YR 5/4 to 10YR 5/6) loamy sand; common, medium, distinct mottles of yellowish brown (10YR 5/8), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/4); weak, medium, subangular blocky structure; very friable; few roots; slightly acid; clear, wavy boundary.

C 40 inches +, alternate bands of sand, silt, and clay of fluvial origin; neutral.

Hesch series

The Hesch soils are moderately deep to deep and are well drained. They are on valley and talus slopes, below areas of Steep stony and rock land. The soils belong to the Brunizem great soil group. They have developed mainly in materials weathered from sandstone, but the parent material contained varying amounts of loess. The Hesch loams developed in materials containing relatively large amounts of loess, and the Hesch fine sandy loams, in materials weathered almost wholly from sandstone.

The soils are somewhat similar to the Hixton soils. They developed under prairie vegetation, however, and the Hixton soils, under timber. Their A horizon is also thicker and darker than that of the Hixton soils.

The Hesch loams vary mainly in the thickness and texture of the subsoil. In most areas of Hesch loams, the subsoil is loam. In some areas, however, the texture of the subsoil ranges to very fine sandy loam or sandy clay loam. Depth to sand ranges from 28 to 42 inches. In places the surface layer and the subsoil of the Hesch loams contain fragments of limestone and sandstone.

The Hesch fine sandy loams occur on valley slopes below steep bluffs where Cambrian sandstone is exposed. Therefore, in places the parent material contains small amounts of fine-textured material that has washed down the slope from soils, formed in loess, that lie on the ridgetops above. In some areas the Hesch fine sandy loams have fragments of limestone and sandstone throughout the profile. Like the Hesch loams, their solum ranges in thickness from 28 to 42 inches, and the texture of the subsoil ranges from loam to fine sandy loam.

Profile of a Hesch loam (SE¼NE¼SE¼ sec. 4, T. 24 N., R. 12 W.):

A_p 0 to 6 inches, very dark brown (10YR 2/2) loam; fine to medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_1 6 to 10 inches, very dark grayish-brown (10YR 3/2) loam; moderate, medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_3 10 to 14 inches, dark-brown (10YR 3/3) loam; weak, medium, subangular blocky structure; friable; roots plentiful; neutral; clear, wavy boundary.

B_1 14 to 19 inches, dark-brown (10YR 4/3) loam to very fine sandy loam; weak, medium, subangular blocky structure; friable; plentiful roots; neutral; clear, wavy boundary.

B_2 19 to 30 inches, dark yellowish-brown (10YR 4/4) loam to sandy clay loam; moderate, medium, subangular blocky structure; friable; plentiful roots; neutral; gradual, wavy boundary.

BC 30 to 42 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, medium, subangular blocky structure; very friable; slightly acid; gradual, wavy boundary.

C 42 inches +, weathered, yellow sandstone.

Profile of a Hesch fine sandy loam (NW¼SE¼ sec. 23, T. 20 N., R. 12 W.):

A_p 0 to 8 inches, very dark brown (10YR 2/2) to black (10YR 2/1) fine sandy loam; weak, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_{11} 8 to 12 inches, black (10YR 2/1) to very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_{12} 12 to 14 inches, black (10YR 2/1) to very dark gray (10YR 3/1) fine sandy loam; weak, fine to medium, subangular blocky structure; very friable; abundant roots; neutral; gradual, smooth boundary.

A_3 14 to 20 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, platy structure; very friable; abundant roots; neutral; gradual, smooth boundary.

B_2 20 to 28 inches, dark-brown (10YR 3/3) loam; weak, medium, subangular blocky structure; friable; contains fragments of sandstone; plentiful roots; neutral; gradual, smooth boundary.

B_3 28 to 32 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, subangular blocky structure; very friable; roots plentiful; contains a few fragments of sandstone; neutral; gradual, smooth boundary.

C 32 inches +, yellowish-brown (10YR 5/4) sandy materials weathered from sandstone, and broken fragments of sandstone; slightly acid.

Hixton series

The Hixton series consists of moderately deep, well-drained, upland soils of the Gray-Brown Podzolic great soil group. The soils developed mainly in materials weathered from fine-grained sandstone.

These soils are similar to the Gale soils, which are also underlain by sandstone but formed in loess. In some places areas of Hixton loams and of Gale silt loams occur in such intricate mixtures that small areas of one kind of soil are mapped with areas of the other. Hixton loams and Hixton fine sandy loams are closely associated in many places. The Hixton fine sandy loams are also closely associated with Boone soils but are less sandy than the Boone soils. The Hixton fine sandy loams are similar to Hixton loams, but they have more sand throughout the solum.

The solum of the Hixton soils is 22 to 36 inches thick. In the Hixton loams, depth to consolidated rock ranges from 36 inches to several feet, but, in the Hixton fine sandy loams, it ranges from 24 inches to several feet. In places the subsoil of the Hixton loams is sandy clay loam. The Hixton soils are mainly on sandstone uplands in the northeastern part of Buffalo County.

Profile of a Hixton loam (SE¼NW¼ sec. 25, T. 23 N., R. 10 W.):

A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; abundant roots; medium acid; clear, smooth boundary.

B_1 6 to 10 inches, dark-brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; roots plentiful; strongly acid; clear, smooth boundary.

B_2 10 to 24 inches, dark yellowish-brown (10YR 4/4), heavy loam; moderate, medium, subangular blocky structure; firm; plentiful roots; strongly acid; gradual, smooth boundary.

B_3 24 to 30 inches, yellowish-brown (10YR 5/4), heavy fine sandy loam; weak, medium, subangular blocky structure; friable; plentiful roots; strongly acid; gradual, smooth boundary.

C 30 inches +, yellowish-brown (10YR 5/8) fine sand; single grain; loose; strongly acid.

Profile of a Hixton fine sandy loam (NW¼NW¼ sec. 15, T. 24 N., R. 13 W.):

A_p 0 to 5 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, granular structure; very friable; abundant roots; medium acid; clear, smooth boundary.

B_1 5 to 8 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, fine, subangular blocky structure; friable; plentiful roots; medium acid; clear, smooth boundary.

B_2 8 to 22 inches, dark-brown (7.5YR 4/4) loam; moderate, medium, subangular blocky structure; friable; plentiful roots; strongly acid; clear, smooth boundary.

B_3 22 to 27 inches, strong-brown (7.5YR 5/6) fine sandy loam; weak, coarse, subangular blocky structure; very friable; plentiful roots; strongly acid; gradual, smooth boundary.

C_1 27 to 36 inches, yellowish-brown (10YR 5/8) fine sand; single grain; loose; few roots; strongly acid; gradual, smooth boundary.

C_2 36 inches +, broken and partially weathered sandstone.

Hubbard series

The Hubbard series consists of well-drained to somewhat excessively drained soils developed in sandy outwash. The soils belong to the Brunizem great soil group. They occur on terraces along streams.

The Hubbard soils are closely associated with the Sparta and Dakota soils. They are similar to those soils, but their solum is finer textured than that of the Sparta soils and coarser textured than that of the Dakota soils.

The principal variations in the profile of the Hubbard soils are in texture and thickness of the subsoil. The texture of the subsoil ranges from sandy loam to loamy sand. Loose sand is at depths ranging from 24 to 36 inches.

In Buffalo County the Hubbard sandy loams and Hubbard loamy fine sands were not mapped separately because the two soil types are similar and are closely associated.

Profile of a Hubbard sandy loam (SW¼SW¼ sec. 25, T. 20 N., R. 12 W.):

A_p 0 to 8 inches, very dark brown (10YR 2/2) sandy loam; weak, very fine to fine, granular structure; very friable; abundant roots; medium acid; gradual, smooth boundary.

A_1 8 to 11 inches, very dark brown (10YR 2/2) fine sandy loam; weak, very fine to fine, granular structure; very friable; abundant roots; medium acid; gradual, smooth boundary.

A_3 11 to 14 inches, very dark grayish-brown (10YR 3/2), light sandy loam; weak, fine to medium, subangular locky structure; very friable; few roots; medium acid; clear, smooth boundary.

B_2 14 to 20 inches, dark-brown (10YR 3/3) to dark yellowish-brown (10YR 3/4), light sandy loam; weak, medium, subangular blocky structure; very friable; few roots; medium acid; gradual, smooth boundary.

B_3 20 to 24 inches, dark yellowish-brown (10YR 3/4) loamy sand to light sandy loam; weak, fine, subangular blocky structure; very friable; few roots; medium acid; gradual, smooth boundary.

C_1 24 to 36 inches, dark yellowish-brown (10YR 4/4) loamy sand; weak, subangular blocky structure to single grain; loose; medium acid; gradual, smooth boundary.

C_2 36 to 42 inches, yellowish-brown (10YR 5/4) medium sand; single grain; loose; medium acid; gradual, smooth boundary.

C_3 42 inches +, brownish-yellow (10YR 6/6) medium sand.

Huntsville series

The Huntsville series consists of moderately well drained to well drained soils of bottom lands. The soils belong to the Alluvial great soil group but are intergrading toward the Brunizems. They have developed in deep silts that have washed fairly recently from soils on uplands and terraces. In most places the profile is dark colored to a depth of 36 inches or more.

The Huntsville soils are similar to the Arenzville soils, also on bottom lands, but they have a darker color. In many places they occur in association with the Fayette, Dubuque, Norden, and Gale soils, which are on uplands. The solum of the Huntsville soils is nearly neutral throughout.

Profile of a Huntsville silt loam (SW¼NE¼ sec. 23, T 23 N., R. 13 W.):

A_p 0 to 8 inches, very dark brown (10YR 2/2) silt loam; weak, fine, subangular blocky structure; very friable; abundant roots; numerous wormcasts; neutral; clear, smooth boundary.

A_1 8 to 14 inches, very dark brown (10YR 2/2) silt loam; weak, thick, platy structure that breaks to weak, medium to fine, subangular blocky structure; very friable; abundant roots; neutral; gradual, smooth boundary.

C_1 14 to 20 inches, dark-brown (10YR 3/3) silt loam; weak, medium, subangular blocky structure; friable; plentiful roots; neutral; gradual, smooth boundary.

C_2 20 to 42 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, coarse, subangular blocky structure; friable; plentiful roots; neutral; gradual, smooth boundary.

C_3 42 inches +, dark yellowish-brown (10YR 3/4 to 10YR 4/4), stratified silt and very fine sand; neutral.

Jackson series

The Jackson series consists of moderately well drained soils developed in a layer of loess that is more than 42 inches thick. The soils belong to the Gray-Brown Podzolic great soil group. They occur on stream terraces in association with the Bertrand soils, which are well drained, and with the Curran soils, which are somewhat poorly drained. The profile of these soils varies but little from place to place.

Profile of a Jackson silt loam (NW¼NE¼ sec. 12, T. 22 N., R. 13 W.):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) to dark-gray (10YR 4/1) silt loam; moderate, medium, granular structure; very friable; roots abundant; slightly acid; clear, smooth boundary.

A_2 8 to 11 inches, dark-gray (10YR 4/1) to dark grayish-brown (10YR 4/2) silt loam; moderate, thin, platy structure; very friable; roots abundant; slightly acid; clear, smooth boundary.

B_1 11 to 16 inches, dark-brown (10YR 4/3) silt loam; weak, thick, platy structure in place, but breaks to moderate, fine, subangular blocky structure; coatings of very dark grayish-brown (10YR 3/2) organic matter on the aggregates; moderately vesicular; roots plentiful; medium acid; clear, smooth boundary.

B_{21} 16 to 23 inches, dark-brown (10YR 4/3) silty clay loam; moderate, fine to medium, subangular blocky structure; coatings of very dark grayish-brown (10YR 3/2) organic matter and gray silica on the aggregates; firm when moist, slightly hard when dry; moderately vesicular; roots plentiful; medium acid; clear, smooth boundary.

B_{22} 23 to 32 inches, dark-brown (10YR 4/3) silt loam; moderate, fine to medium, subangular blocky structure; coatings on aggregates similar to those in the B_{21} horizon; firm when moist, slightly hard when dry; roots plentiful; many, small, distinct mottles of yellowish brown (10YR 5/6), dark brown (7.5YR 4/4), and yellowish red (5YR 4/6); medium acid; clear, smooth boundary.

B_3 32 to 37 inches, yellowish-brown (10YR 5/4), light silty clay loam; weak, medium, subangular blocky structure; firm when moist, slightly hard when dry; mottling similar to that in B_{22} horizon, but also has coarse, prominent mottles of dark reddish brown (5YR 3/4); roots plentiful; medium acid; gradual, smooth boundary.

C 37 inches +, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silt loam; massive; friable; many, distinct, medium mottles of yellowish red (5YR 4/6), yellowish brown (10YR 5/6), and grayish brown (10YR 5/2); medium acid.

Judson series

The Judson series consists of deep, well-drained, silty soils that belong to the Alluvial great soil group. The soils occur in drainageways and on alluvial fans in the uplands and on terraces. They are similar to the Chaseburg soils except that they have a darker color.

A few areas of Judson soils have only moderately good drainage. The thickness of the dark-colored layer of silty material ranges from 18 to 42 inches. In places thin layers of fine sand occur at varying depths throughout the profile.

Profile of a Judson silt loam (NW¼NW¼ sec. 23, T. 23 N., R. 13 W.):

A_{11} 0 to 24 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) silt loam; evidence of mixing of surface organic matter by earthworms; weak, medium, granular structure; vesicular; very friable; abundant roots; neutral; diffuse, smooth boundary.

A_{12} 24 to 36 inches, very dark grayish-brown (10YR 3/2) silt loam; evidence of mixing of surface organic matter by earthworms; weak, medium, granular structure; vesicular; very friable; plentiful roots; neutral; diffused, smooth boundary.

C_1 36 to 42 inches, dark yellowish-brown (10YR 3/4 to 10YR 4/4) silt loam; weak, medium, granular structure; very friable; roots plentiful; slightly acid; diffuse, smooth boundary.

C_2 42 inches +, yellowish-brown (10YR 5/4) silt loam; massive; friable; slightly acid.

Lindstrom series

The Lindstrom series consists of well-drained upland soils developed in deep, silty materials. The soils belong to the Brunizem great soil group. They occur on valley slopes in association with Hesch, Norden, and Fayette valleys soils.

In many places the surface layer of the Lindstrom soils has a gritty feel because fine sand from the areas of Steep stony and rocky land above has washed or fallen onto it. In this respect it is similar to the Fayette valleys soils. In Buffalo County the Lindstrom soils are mainly near Modena and in Waumandee Valley.

The Lindstrom soils vary chiefly in the color and thickness of the A horizon. In areas that are eroded, the A horizon is browner and thinner than that in areas that are not eroded.

Profile of a Lindstrom silt loam (SE¼NW¼ sec. 30, T. 21 N., R. 11 W.):

A_p 0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, medium, granular structure; very friable; abundant roots; neutral; gradual, smooth boundary.

A_1 8 to 12 inches, very dark brown (10YR 2/2) silt loam; weak, thin, platy and moderate, medium, granular structure; very friable; abundant roots; slightly acid; gradual, smooth boundary.

B_1 12 to 17 inches, dark-brown (10YR 3/3) silt loam; moderate, medium to fine, subangular blocky structure; friable; highly vesicular; earthworm holes and channels and considerable mixing as the result of earthworm activity; light-gray (10YR 7/2) coatings of silt on the surfaces of peds; roots plentiful; medium acid; gradual, smooth boundary.

B_{21} 17 to 25 inches, dark-brown (10YR 3/3) to dark yellowish-brown (10YR 3/4), light silty clay loam; moderate, medium, subangular blocky structure; friable; highly vesicular; earthworm holes and root channels; light-gray (10YR 7/2) coatings of silt on the surfaces of peds; slightly acid; gradual, smooth boundary.

B_{22} 25 to 35 inches, dark yellowish-brown (10YR 3/4), light silty clay loam; moderate, fine to medium, subangular blocky structure; firm; highly vesicular; earthworm holes and root channels; light-gray (10YR 7/2) coatings of silt on the surfaces of peds; plentiful roots; slightly acid; gradual, smooth boundary.

B_3 35 to 42 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 3/4) silty clay loam; a few, medium, distinct mottles of yellowish brown (10YR 5/6) to grayish brown (10YR 5/2); weak, medium, subangular blocky structure; firm; slightly acid; gradual, smooth boundary.

C 42 inches +, dark yellowish-brown (10YR 4/4) silt loam; a few, medium, distinct mottles of yellowish brown (10YR 5/6) to grayish brown (10YR 5/2); massive; friable; slightly acid.

Medary series

The Medary soils are deep and are well drained to moderately well drained. They belong to the Gray-Brown Podzolic great soil group. These soils occur on high stream terraces. The upper part of the solum formed in a thin layer of loess, but the rest of the solum formed from reddish-brown, heavy, lacustrine clay. In most of the areas, the soils are closely associated with Bertrand silt loams, which are also on terraces. The soils of the two series are somewhat similar, but the Bertrand soils are underlain by silt rather than by clay.

In Buffalo County the Medary soils vary chiefly in the thickness of the layer of silt. In most of the areas, the covering of silt is thin and reddish-brown clay is just below the surface. Internal drainage is somewhat restricted by the clayey subsoil and substratum.

Profile of a Medary silt loam (NW¼NE¼ sec. 26, T. 22 N., R. 13 W.):

A_p 0 to 8 inches, dark-brown (7.5YR 3/2 to 7.5YR 4/2) silt loam; moderate, medium, granular structure; friable; abundant roots; neutral; clear, smooth boundary.

A_2 8 to 11 inches, dark-brown (7.5YR 4/2) silt loam in the upper part of horizon and reddish-brown (5YR 4/3) silt loam below; moderate, medium, platy structure; a few gray (5YR 6/1) coatings of silt on the peds; friable; abundant roots; moderately vesicular; slightly acid; gradual, smooth boundary.

B_{21} 11 to 18 inches, reddish-brown (5YR 4/3) silty clay loam; strong, fine to medium, angular blocky structure; a few gray (5YR 6/1) coatings of silt on the peds; very firm when moist, very hard when dry, and plastic when wet; plentiful roots; finely vesicular; slightly acid; gradual, smooth boundary.

B_{22} 18 to 30 inches, reddish-brown (5YR 4/3) silty clay to clay; strong, medium, angular blocky structure, but prismatic in place; very firm when moist, very hard when dry, plastic when wet; plentiful roots; medium acid; clear, smooth boundary.

B_3 30 to 36 inches, brown (7.5YR 5/4) silty clay loam; strong, medium, angular blocky structure; prismatic in place; very firm when moist, very hard when dry, and plastic when wet; medium acid; clear, smooth boundary.

C 36 inches +, reddish-brown (5YR 4/3) silty clay that contains thin streaks of sand; massive; very firm when moist, very hard when dry, and plastic when wet; medium acid.

Meridian series

This series consists of moderately deep, well-drained, medium-textured soils that overlie loose sand. In this county the series also includes a moderately well drained variant. The soils belong to the Gray-Brown Podzolic great soil group.

The typical Meridian soils are closely associated with the Dakota, Gotham, Plainfield, and Tell soils. They have a thinner, lighter colored A horizon than the Dakota soils and a finer textured solum than the Gotham and Plainfield soils. They lack the silty texture throughout the solum that is typical of the Tell soils.

The thickness of the solum ranges from 24 to 36 inches in the typical Meridian soils. In places the underlying sands contain thin layers of finer textured materials. In areas of Meridian loams that have been cultivated, the color of the surface layer ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2). The color of the B_2 horizon ranges from dark yellowish brown (10YR 4/4) to reddish brown (5YR 4/4), and its texture, from loam to sandy clay loam.

In areas of Meridian fine sandy loams that have been cultivated, the color of the surface layer ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2). The texture of the B_2 horizon ranges from a heavy fine sandy loam to loam or sandy clay loam.

Meridian soils occur throughout the county, but they are mainly along the Buffalo River and its tributaries.

The soils mapped as Meridian loams, moderately well drained variants, formed in stratified sandy deposits. The parent material of these soils was derived mainly from sandstone, but in places it contained small amounts of loess or of materials weathered from limestone. These moderately well drained variants are associated with the Granby soils, but have better drainage than those soils. They are also associated with the well-drained Meridian soils. The soils occur in small, scattered areas, mainly throughout the northeastern part of Buffalo County.

Profile of a Meridian loam (NW¼NE¼ sec. 26, T. 22 N., R. 13 W.):

A_p 0 to 7 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) loam; weak, medium to fine, granular structure; friable; very abundant roots; neutral; clear, smooth boundary.

A_2 7 to 11 inches, dark grayish-brown (10YR 4/2) loam; weak, thin, platy structure; very friable; roots plentiful; neutral; clear, smooth boundary.

B_1 11 to 18 inches, dark-brown (10YR 4/3) loam; weak, fine, subangular blocky structure; friable; roots plentiful; slightly acid; clear, smooth boundary.

B_2 18 to 28 inches, dark-brown (7.5YR 4/4) sandy clay loam; includes grains of coarse sand; moderate, medium, subangular blocky structure; dark reddish-brown (5YR 3/4) coatings on peds; slightly hard when dry, firm when moist; roots plentiful; medium acid; clear, smooth boundary.

B_3 28 to 36 inches, dark-brown (7.5YR 4/4) sandy loam; weak, medium, subangular blocky structure; very friable; few roots; medium acid; gradual, smooth boundary.

C 36 inches +, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) sand; medium acid.

Profile of a Meridian fine sandy loam (NW¼SW¼ sec. 10, T. 24 N., R. 11 W.):

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular to moderate, medium, subangular blocky structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_2 8 to 11 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, medium, platy structure; very friable; plentiful roots; slightly acid; clear, smooth boundary.

B_2 11 to 25 inches, dark yellowish-brown (10YR 4/4) sandy clay loam to light loam; moderate, medium, subangular blocky structure; moderately vesicular; dark-brown (10YR 3/3) coatings on surfaces of peds; firm when moist, slightly hard when dry; few roots; medium acid; gradual, smooth boundary.

B_3 25 to 28 inches, yellowish-brown (10YR 5/4) fine sandy loam; moderate, medium, subangular blocky structure; very friable; medium acid; gradual, smooth boundary.

C 28 inches +, yellowish-brown (10YR 5/4) medium sand; single grain; loose; medium acid.

Profile of a Meridian loam, moderately well drained variant (NE¼NE¼ sec. 27, T. 23 N., R. 10 W.):

A_p 0 to 10 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, subangular blocky structure breaking to weak, fine granules; very friable; neutral; clear, smooth boundary.

A_2 10 to 14 inches, dark gray (10YR 4/1) to very dark gray (10YR 3/1) loam; a few, fine, faint mottles of dark brown (7.5YR 4/4) and yellowish brown (10YR 5/8); moderate, thin to medium, platy structure; very friable; neutral; clear, smooth boundary.

B_1 14 to 19 inches, dark-brown (10YR 4/3) loam; a few, fine, distinct mottles of dark brown (7.5YR 4/4) to yellowish brown (10YR 5/8) and very dark grayish-brown (10YR 3/2) coatings on surfaces of peds; moderate, thick plates breaking to moderate, fine, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

B_{21} 19 to 26 inches, dark-brown (10YR 4/3), heavy loam; moderate, medium, subangular blocky structure; very dark grayish-brown (10YR 3/2) coatings on the surfaces of peds; firm when moist, slightly hard when dry; moderately vesicular; medium acid; gradual, smooth boundary.

B_{22} 26 to 34 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/5), heavy fine sandy loam; moderate, medium, subangular blocky structure; dark grayish-brown (10YR 4/2) coatings on the surfaces of peds; firm when moist, slightly hard when dry; moderately vesicular; medium acid; gradual, smooth boundary.

B_3 34 to 40 inches, yellowish-brown (10YR 5/4) sandy loam; common, medium, distinct mottles of dark brown (7.5YR 4/4) and yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

C 40 inches +, yellowish-brown (10YR 5/6) fine sand that has a few mottles; loose.

Norden series

The Norden series consists of moderately deep, well-drained soils of the uplands. The soils belong to the Gray-Brown Podzolic great soil group. They overlie greenish, glauconitic, fine-grained, shaly sandstone of the Franconia formation. The sandstone is at a depth of 24 to 42 inches.

The Norden soils are associated with the Hixton, Gale, Boone, and Fayette valleys soils. In places they are also associated with Lindstrom and Urne soils. The sandstone that underlies the Norden soils is of a different kind than that underlying the Hixton, Gale, and Boone soils. The Norden silt loams formed in a thinner layer of silt than that in which the Fayette valleys and Lindstrom soils developed. The Norden soils are somewhat similar to the Urne soils, but the Urne soils lack a B horizon and have a thinner solum.

The Norden soils occur throughout Buffalo County. They are mainly on narrow ridges that are at an intermediate height between the stream terraces and the uplands capped by limerock. In places, however, the sandstone has weathered back so that the soils are now on valley slopes. In the northern part of the county, small areas of Norden soils are on the tops of ridges, where the sandstone of the Franconia formation is underlain by other kinds of sandstone.

The Norden loams vary chiefly in the thickness and texture of the subsoil. The texture of the subsoil ranges from loam to very fine sandy loam or gritty silt loam.

In areas of Norden fine sandy loams that have been cultivated, the color of the surface layer ranges from dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). The subsoil varies considerably in texture and in thickness. Depending upon the texture of the strata of Franconia sandstone underlying the soils, the texture of the subsoil in the Norden fine sandy loams ranges from a heavy fine sandy loam to a gritty silt loam. As in all of the Norden soils, the strata of the Franconia formation vary in color, in texture, and in thickness, hardness, and reaction. The individual strata range from strongly acid to moderately alkaline in reaction.

In areas of Norden silt loams that have been cultivated, the color of the surface layer ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2). The color of the B_2 horizon ranges from yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4), and their texture, from silt loam to silty clay loam.

Profile of a Norden loam (NE¼SW¼ sec. 10, T. 23 N., R. 11 W.):

A_1 0 to 2 inches, black (10YR 2/1) loam; weak, medium, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_2 2 to 12 inches, dark grayish-brown (10YR 4/2) silt loam to very fine sandy loam; weak, thin, platy structure; very friable; abundant roots; slightly acid; clear, smooth boundary.

B_1 12 to 18 inches, dark yellowish-brown (10YR 4/4) very fine sandy loam; moderate, fine, subangular blocky structure; friable; plentiful roots; medium acid; gradual, smooth boundary.

B_2 18 to 27 inches, olive-brown (2.5Y 4/4) and dark yellowish-brown (10YR 4/4) gritty silt loam; moderate, fine to medium, subangular blocky structure; firm when moist, slightly hard when dry; plentiful roots; medium acid; gradual, smooth boundary.

B_3 27 to 36 inches, olive-brown (2.5Y 4/4) very fine sandy loam to silt loam; weak, medium, subangular blocky structure; firm when moist, slightly hard when dry; roots plentiful; medium acid; gradual, smooth boundary.

C 36 inches +, partly weathered, light olive-brown (2.5Y 5/4 and 2.5Y 5/6) strata of glauconitic sandstone; strata vary in color and texture and range from sandstone to siltstone; easily crushed; slightly acid.

Profile of a Norden fine sandy loam (NW¼NE¼NW¼ sec. 8, T. 24 N., R. 13 W.):

A_p 0 to 7 inches, dark-brown (10YR 3/3) fine sandy loam; weak, thick, platy macrostructure breaking to weak, fine, subangular blocky structure; very friable; roots abundant; slightly acid; clear, smooth boundary.

A_2 7 to 11 inches, brown (10YR 5/3) fine sandy loam to very fine sandy loam; moderate, thin, platy structure; very friable; abundant roots; medium acid; clear, smooth boundary.

B_1 11 to 16 inches, yellowish-brown (10YR 5/4) silt loam; weak, thick, platy macrostructure breaking to moderate, fine, subangular blocky structure; friable; plentiful roots; strongly acid; clear, smooth boundary.

B_2 16 to 21 inches, yellowish-brown (10YR 5/6) silt loam; moderate, fine to medium, subangular blocky structure; friable; plentiful roots; strongly acid; gradual, wavy boundary.

B_3 21 to 26 inches, yellowish-brown (10YR 5/6) silt loam to very fine sandy loam; moderate, fine to medium, subangular blocky structure; dark yellowish-brown (10YR 4/4) coatings of silt on the peds; numerous fine- and medium-sized fragments of sandstone that crush easily to very fine sandy loam; plentiful roots; medium acid; gradual, wavy boundary.

C_1 26 to 30 inches, light olive-brown (2.5Y 5/6) very fine sandy loam to fine sandy loam; weak, thick, platy macrostructure breaking to fine subangular blocky structure; very friable; numerous fine- and medium-sized fragments of sandstone that crush easily to very fine sandy loam; strongly acid; gradual, wavy boundary.

C_2 30 to 34 inches, light olive-brown (2.5Y 5/4), weathered, finely laminated siltstone that crushes easily; strongly acid; gradual, wavy boundary.

C_3 34 inches +, laminated, partly weathered, light olive-brown (2.5Y 5/4 and 5/6), soft glauconitic sandstone; crushes easily to a fine sand; layered, variably textured and variably colored sandstone below, the strata ranging in reaction from medium acid to moderately alkaline.

Profile of a Norden silt loam (NE¼NW¼ sec. 31, T. 24 N., R. 11 W.):

A_1 0 to 2 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_2 2 to 9 inches, grayish-brown (10YR 5/2) silt loam; moderate, thin, platy, vesicular structure; very friable; abundant roots; medium acid; clear, smooth boundary.

B_1 9 to 12 inches, brown (10YR 5/3) silt loam; moderate, very fine, subangular blocky, vesicular structure; friable; light-gray (10YR 7/2) coatings of silt on peds; roots plentiful; strongly acid; clear, smooth boundary.

B_{21} 12 to 16 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, subangular blocky, vesicular structure; dark yellowish-brown (10YR 4/4) coatings of silt on peds; plentiful roots; strongly acid; gradual, smooth boundary.

B_{22} 16 to 28 inches, yellowish-brown (10YR 5/4), crushed, to yellowish-brown (10YR 5/6), light silty clay loam; firm; moderate, medium, subangular blocky structure; vesicular; dark-brown (10YR 4/3) coatings of silica on peds; also a few very dark gray (5YR 3/1) to dark reddish-brown (5YR 2/2) spots of iron and manganese beginning on the outside and carrying through the peds; plentiful roots; strongly acid; gradual, smooth boundary.

B_3 28 to 36 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; a few, fine, faint mottles and a few very dark gray (5YR 3/1) to dark reddish-brown (5YR 2/2) spots of iron or manganese beginning on the outside and carrying through the peds; plentiful roots; strongly acid; clear, abrupt boundary.

D_1 36 to 38 inches, dark olive-gray (5Y 3/2) clay; strong, medium to coarse, angular blocky structure; very hard when dry, slightly sticky when wet; strongly acid.

D_2 38 inches +, partly weathered strata of the Franconia formation; strata vary in color and texture, and reaction ranges from strongly acid to moderately alkaline.

Orion series

The Orion series is made up of somewhat poorly drained soils developed in silty sediments on the flood plains of streams. The soils belong to the Alluvial great soil group. They are closely associated with the Arenzville soils and are also associated with Fayette, Dubuque, and Norden soils, which are all on uplands. The Orion soils are similar to the Arenzville soils but are less well drained.

The sandy layers that occur throughout the profile vary in number and in thickness. In places the sandy layers are lacking. The color and degree of mottling also vary.

Profile of an Orion silt loam (SE¼NE¼ sec. 23, T. 23 N., R. 13 W.):

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam that contains lenses of sand; weak, medium, granular to weak, fine, subangular blocky structure; very friable; abundant roots; neutral; abrupt, smooth boundary.

C_1 8 to 24 inches, brown (10YR 5/3) and dark grayish-brown (10YR 4/2 or 2.5Y 4/2), thinly laminated silt loam and very fine sand; common, medium, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4 or 2.5YR 2/4); very friable; plentiful roots; neutral; gradual, smooth boundary.

C_2 24 inches +, dark grayish-brown (2.5Y 4/2), thin, indistinct layers of silt loam and very fine sand; common, medium, distinct mottles of dark brown (7.5YR 4/4) and dark reddish brown (5YR 3/4 or 2.5YR 2/4); neutral.

Peat and Muck

The Peat soils in this county consist mainly of the remains of sedges and grasses in various stages of decomposition. They also contain the partly decomposed remains of tamaracks. The soils range from slightly acid to moderately alkaline.

The Mucks are closely associated with the Peats. They have also formed from the remains of sedges and grasses, but the remains have reached a more advanced stage of decomposition. In the Mucks, little or no fibrous material remains. In most areas in this county, the areas of Peat have been burned over, or attempts have been made to cultivate them. As a result, much of the fibrous material in the surface layer has been removed or is in an advanced stage of decomposition.

The Peat soils occur in nearly level areas or in slight depressions in the broad valleys of streams. They are very poorly drained and are subject to frequent flooding. In Buffalo County these soils range from 12 inches to approximately 7 feet in thickness. The Peat and Muck soils that are less than 42 inches thick over sand were mapped separately from the deeper Peats and Mucks, which are underlain by both sand and silt. The Peats and Mucks are mainly in the northern part of the county in the broad valley of Bear Creek. This area is sometimes called the Mondovi Marsh.

Profile of a Peat (NE¼SE¼ sec. 7, T. 24 N., R. 11 W.):

1 0 to 12 inches, black (N 2/0) mucky peat; few fibrous remains of sedges and grasses, which are very soft and easily compressed to a mucky consistence; weak, coarse, granular structure; very friable; roots abundant; slightly acid; clear, smooth boundary.

2 12 to 28 inches, black (N 2/0) mucky peat containing many fine, soft remains of plants; weak, thick, platy structure; very friable; many vertical root channels with yellowish-red (5YR 4/8) stainings in and around the channels; neutral; gradual, smooth boundary.

3 28 inches +, very dark brown (10YR 2/2), fine, fibrous peat containing a few woody remains of tamaracks; the plant fibers are soft; thick, platy structure; moderately alkaline.

Plainfield series

The soils of the Plainfield series are excessively drained Regosols. The soils have developed in sandy outwash on the terraces of both large and small streams throughout the county. The sandy outwash was derived from sandstone of Cambrian age.

The Plainfield soils are closely associated with the Sparta soils and differ from those soils in having lighter colored, thinner A horizons. They are also associated with soils of the Gotham and Meridian series but differ from those soils in having a coarser texture in the lower part of the profile.

In this county a loamy substrata variant of the Plainfield soils is mapped. This soil is similar to the typical Plainfield soils. It is somewhat excessively drained, however, and, in the lower part of the profile, it has bands of a material that is finer textured than that in the typical Plainfield soils. These bands are at depths of 3 to 6 feet. The soil material in the bands ranges from slightly cemented lenses of fine sand, less than 1 inch thick, to silty or clayey material, as much as 6 inches thick. In places there are faint mottles immediately above the bands of finer textured materials.

Profile of a Plainfield loamy fine sand (SW¼SW¼ sec. 3, T. 23 N., R. 13 W.):

A_p 0 to 7 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) loamy fine sand; weak, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_1 7 to 10 inches, dark-brown (10YR 3/3) loamy fine sand; weak, coarse, subangular blocky macrostructure breaking to weak, fine, granular structure; very friable; few roots; neutral; clear, wavy boundary.

A_3 10 to 14 inches, dark yellowish-brown (10YR 3/4) fine sand; massive; loose; few roots; neutral; clear, wavy boundary.

C_1 14 to 36 inches, dark yellowish-brown (10YR 4/4) fine sand; massive; loose; few roots; medium acid; gradual, smooth boundary.

C_2 36 to 60 inches, yellowish-brown (10YR 5/4), stratified fine sand; massive; loose; strongly acid.

Profile of a Plainfield loamy fine sand, loamy substrata variant (SE¼NW¼ sec. 24, T. 20 N., R. 12 W.):

A_p 0 to 10 inches, dark-gray (10YR 4/1) to very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine to medium, angular blocky macrostructure breaking to weak, fine, granular structure; very friable; abundant roots; neutral; abrupt, smooth boundary.

A_3 10 to 18 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) fine sand; weak, fine to medium, subangular blocky macrostructure breaking to single grain; loose; few roots; neutral; gradual, smooth boundary.

C_1 18 to 34 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) fine sand; single grain; loose; few roots; neutral; gradual, smooth boundary.

C_2 34 to 40 inches, reddish-brown (5YR 4/3) to dark reddish-brown (5YR 3/3) sandy loam; massive; friable; few roots; slightly acid; gradual, smooth boundary.

C_3 40 to 44 inches, dark grayish-brown (10YR 4/2) fine sand; single grain; loose; few roots; slightly acid; abrupt, smooth boundary.

C_4 44 to 46 inches, reddish-brown (5YR 4/3) to dark reddish-brown (5YR 3/3), light silt loam; massive; friable; few roots; slightly acid; abrupt, smooth boundary.

D 46 inches +, alternating layers of fine sand and sandy loam that extend to a depth of many feet.

Richwood series

The Richwood series consists of deep, well-drained, silty soils formed in silts of Peorian age. The soils belong to the Brunizem great soil group. They are on the nearly level terraces of streams, mainly throughout the valleys of Waumandee Creek.

The Richwood soils are associated with the Toddville soils, which are moderately well drained, and with the Rowley soil, which is somewhat poorly drained. They are similar to the Bertrand soils except that they developed under prairie, and the Bertrand, under timber. The Richwood soils are also similar to the Waukegan soils, but they are deeper over sand than the Waukegan soils.

The Richwood soils vary chiefly in having faint mottling in places in the lower part of the B horizon. In areas where mottling occurs, the Richwood soils are similar to the Toddville soils.

Profile of a Richwood silt loam (SE¼NE¼ sec. 30, T. 21 N., R. 11 W.):

A_p 0 to 8 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; very friable; abundant roots; neutral; gradual, smooth boundary.

A_1 8 to 12 inches, very dark gray (10YR 3/1) silt loam; moderate, thin to medium, platy structure; very friable; abundant roots; neutral; gradual, smooth boundary.

B_1 12 to 18 inches, dark yellowish-brown (10YR 3/4), light silty clay loam; weak, thick, platy macrostructure breaking to moderate, fine, subangular blocky structure; highly vesicular; much earthworm activity; light-gray (10YR 7/2) coatings of silt and of organic matter on peds; plentiful roots; slightly acid; gradual, smooth boundary.

B_{21} 18 to 26 inches, dark yellowish-brown (10YR 3/4) silty clay loam; moderate, medium, subangular blocky structure; firm; highly vesicular; much earthworm activity; very dark brown (10YR 2/2) coatings of organic matter and light-gray (10YR 7/2) coatings of silt on the peds; plentiful roots; medium acid; gradual, smooth boundary.

B_{22} 26 to 34 inches, dark grayish-brown (10YR 4/2) to dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; highly vesicular; much earthworm activity; light-gray (10YR 7/2) coatings of silt on peds; plentiful roots; medium acid; gradual, smooth boundary.

B_3 34 to 42 inches, dark grayish-brown (10YR 4/2) to dark-brown (10YR 4/3), light silty clay loam; weak, medium, subangular blocky structure; friable; highly vesicular; much earthworm activity; light-gray (10YR 7/2) coatings of silt on peds; a few, faint mottles of yellowish brown (10YR 5/6); plentiful roots; medium acid; gradual, wavy boundary.

C 42 to 60 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) silt loam; a few, faint mottles of yellowish brown (10YR 5/6); slightly acid.

Rowley series

The Rowley series consists of somewhat poorly drained soils formed in deep silts of Peorian age. The soils are on the terraces along streams. They are Brunizems but are intergrading toward soils of the Humic Gley great soil group. The soils are silty, but in places they are underlain by sand at a depth greater than 42 inches. The solum is slightly acid throughout, but in places the substratum is neutral with increasing depth.

The Rowley soils are in the same catena as the Richwood soils, which are well drained, and with the Toddville soils, which are moderately well drained. They are somewhat similar to the Curran soils, but they have a deeper, darker colored surface layer and no A_2 horizon. The Rowley soils vary chiefly in color and in the intensity of mottling.

Profile of a Rowley silt loam (NW¼NW¼ sec. 31, T. 24 N., R. 12 W.):

A_p 0 to 8 inches, black (10YR 2/1) silt loam; moderate, fine to medium, granular structure; friable; plant roots plentiful; neutral; abrupt, smooth boundary.

A_{12} 8 to 12 inches, black (10YR 2/1) silt loam; weak, fine, subangular blocks that break to moderate, fine to medium granules; friable; plant roots plentiful; neutral; clear, smooth boundary.

A_3 12 to 16 inches, very dark gray (10YR 3/1) silt loam; weak, medium plates; very friable; plant roots plentiful; many, fine, distinct mottles of grayish brown (10YR 5/2) and yellowish brown (10YR 5/8); slightly vesicular; slightly acid; clear, smooth boundary.

B_{21} 16 to 21 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, medium to thick, platy structure; firm; many, medium, distinct mottles of grayish brown (10YR 5/2) and yellowish brown (10YR 5/8); moderately vesicular; plant roots plentiful; medium acid; clear, wavy boundary.

B_{22g} 21 to 32 inches, grayish-brown (10YR 5/2) silty clay loam; moderate, fine to medium, subangular blocky structure; slightly hard when dry, firm when moist; mottling similar to that in B_{21} horizon; moderately vesicular; plant roots plentiful; medium acid; clear, wavy boundary.

B_{3g} 32 to 38 inches, grayish-brown (2.5Y 5/2), light silty clay loam; weak, fine, subangular blocky structure; slightly hard when dry, firm when moist; many, medium, prominent, dark-brown (7.5YR 4/4) mottles; few plant roots; medium acid; clear, smooth boundary.

C 38 inches +, grayish-brown (2.5Y 5/2), light silty clay loam; massive; slightly hard when dry, firm when moist; mottling similar to that in B_{3g} horizon; many small manganese concretions; stainings from organic matter extending downward in old root channels from horizons above; slightly acid; underlain by medium sand at a depth below 5 feet.

Sparta series

The Sparta series consists of excessively drained Regosols that are intergrading toward soils of the Brunizem great soil group. The soils formed under grass in acid, sandy materials that consisted almost entirely of quartz sand. They are on level to gently sloping outwash plains and on the terraces of streams.

The Sparta soils are closely associated with the Plainfield, Gotham, and Hubbard soils. They have a thicker, darker colored A horizon than the Plainfield soils and less fine material in the subsoil than the Gotham and Hubbard soils. In Buffalo County the Sparta soils are mainly along the Chippewa and Mississippi Rivers and along some of their tributaries.

In general, the color of the A horizons ranges from very dark brown (10YR 2/2) to black (10YR 2/1), but in areas where the soils have been reworked by wind, the color in places is very dark grayish brown (10YR 3/2). In a few places there are small areas that have a surface layer of loamy sand or fine sand that are mapped as Sparta loamy fine sands.

In this county a loamy substrata variant of the Sparta loamy fine sands is mapped. This soil is somewhat excessively drained. It differs from the normal Sparta loamy fine sands in having layers at a depth of 3 to 6 feet that are finer textured than those in the typical Sparta loamy fine sands. In many places these soils also have faint mottles in or immediately above these finer textured layers. The layers range from slightly cemented lenses of fine sand, less than 1 inch thick, to silty or clayey layers, as much as 6 inches thick. The loamy substrata variant of the Sparta loamy fine sands is commonly associated with Plainfield loamy fine sands and with normal Sparta loamy fine sands.

Profile of a Sparta loamy fine sand (NE¼NE¼ sec. 7, T. 20 N., R. 12 W.):

A_{11} 0 to 18 inches, very dark grayish-brown (10YR 3/2) to very dark brown (10YR 2/2) loamy fines and; weak, medium, subangular blocky structure; very friable to loose; plentiful roots; neutral; clear, wavy boundary.

A_{12} 18 to 24 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) loamy fine sand; weak, medium, subangular blocky structure; very friable to loose; few roots; slightly acid; clear, wavy boundary.

A_{13} 24 to 32 inches, dark-brown (10YR 3/3) loamy fine sand; weak to medium, fine, subangular blocky structure; loose; few roots; medium acid; clear, smooth boundary.

C_1 32 to 38 inches, dark-brown (10YR 4/3) fine sand; massive; loose; medium acid; gradual, smooth boundary.

C_2 38 inches +, yellowish-brown (10YR 5/4) fine sand grading to yellowish brown (10YR 5/6) with depth; massive; loose; medium acid.

Profile of a Sparta loamy fine sand, loamy substrata variant (SW¼SE¼ sec. 11, T. 24 N., R. 10 W.):

A_p 0 to 6 inches, very dark brown (10YR 2/2) to very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine, granular structure; very friable; abundant roots; neutral; clear, smooth boundary.

A_1 6 to 11 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, medium, subangular blocky structure; very friable; abundant roots; slightly acid; clear, smooth boundary.

A_3 11 to 28 inches, very dark grayish-brown (10YR 3/2) to dark-brown (10YR 3/3) loamy fine sand; weak, medium, subangular blocky structure; very friable; roots plentiful; medium acid; clear, wavy boundary.

C_1 28 to 34 inches, brown (10YR 5/3) to light yellowish-brown (10YR 6/4) medium sand; single grain; loose; few roots; strongly acid; clear, wavy boundary.

C_2 34 to 48 inches, brown (10YR 5/3) to pale-brown (10YR 6/3) medium sand; single grain; loose; few roots; medium acid; clear, wavy boundary.

C_3 48 to 52 inches, yellowish-brown (10YR 5/4) sandy clay loam to loam; a few, distinct, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; slightly hard when dry, firm when moist, slightly sticky when wet; strongly acid; clear, wavy boundary.

C_4 52 inches +, very pale brown (10YR 7/4) medium sand streaked with yellowish brown (10YR 5/4); a few distinct mottles of yellowish brown (10YR 5/4); single grain; loose; strongly acid.

Tell series

The Tell series consists of well-drained soils developed in loess. The soils belong to the Gray-Brown Podzolic great soil group. They occur on stream terraces and are underlain by fluvial sands that are strongly acid to mildly acid.

The Tell soils occur in association with the Bertrand and Meridian soils. They differ from the Bertrand soils in that the Bertrand soils are underlain by silt at depths of more than 42 inches. The Tell soils have more fine-textured material in the surface layer and subsoil than the Meridian soils.

In color the surface layer of a cultivated Tell silt loam ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2). Depth to loose sand ranges from 26 to 42 inches. The most common depth to sand, however, is about 30 inches.

Profile of a Tell silt loam (cultivated) (SW¼SE¼ sec. 17, T. 23 N., R. 11 W.):

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, subangular blocky structure breaking to weak, fine granules; friable; roots abundant; slightly acid; clear, smooth boundary.

A_2 8 to 11 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; vesicular; roots plentiful; medium acid; clear, smooth boundary.

B_1 11 to 15 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, thick, platy structure in place, breaking readily to moderate, fine, subangular blocks; a few light-gray (10YR 7/2) coatings of silica on peds; friable; vesicular; roots plentiful; strongly acid; clear, smooth boundary.

B_2 15 to 26 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) silty clay loam; a few light-gray (10YR 7/2) coatings of silica on peds; firm; vesicular; roots plentiful; strongly acid; gradual, smooth boundary.

B_3 26 to 30 inches, yellowish-brown (10YR 5/4) silt loam; moderate, coarse, subangular blocky structure; thin, dark-brown (10YR 4/3) coatings on peds; friable; roots fewer than in horizon just above; strongly acid; gradual, smooth boundary.

D 30 inches +, yellowish-brown, fluvial sands that contain dark-colored minerals; strongly acid.

Toddville series

The Toddville series consists of moderately well drained Brunizems formed in deep deposits of silt (loess). The soils are on terraces along streams. They are closely associated with the well-drained Richwood and the somewhat poorly drained Rowley soils. The Toddville soils vary slightly in the number of mottles and in depth to mottling.

Profile of a Toddville silt loam (SW¼NW¼ sec. 31, T. 24 N., R. 12 W.):

A_p 0 to 7 inches, very dark brown (10YR 2/2) to black (10YR 2/1) silt loam; moderate, fine, subangular blocky macrostructure that breaks to moderate, medium and fine granules; very friable; abundant roots; neutral; clear, smooth boundary.

A_{12} 7 to 11 inches, very dark brown (10YR 2/2) to black (10YR 2/1) silt loam; moderate, medium, granular structure; very friable; abundant roots; neutral; clear, wavy boundary.

A_3 11 to 18 inches, very dark brown (10YR 2/2) to very dark gray (10YR 3/1) silt loam; weak, thick, platy macrostructure that breaks to moderate, fine, subangular blocky structure; very friable; plentiful roots; slightly acid; gradual, smooth boundary.

B_1 18 to 24 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, subangular blocky structure; very dark grayish-brown (10YR 3/2) coatings on the surfaces of peds; friable; plentiful roots; medium acid; clear, wavy boundary.

B_2 24 to 29 inches, dark-brown (10YR 4/3) silty clay loam; a few, fine, faint mottles; moderate, medium and fine, subangular blocky structure; dark grayish-brown (10YR 4/2) coatings on the surfaces of peds; friable; strongly acid; clear, wavy boundary.

B_3 29 to 35 inches, dark-brown (10YR 4/3), light silty clay loam; many, small, distinct mottles; moderate, medium, subangular blocky structure; dark grayish-brown (10YR 4/2) coatings on the surfaces of peds; friable.

C 35 inches +, dark-brown (10YR 4/3) silt loam; mottlings more prominent than in B_3 horizon; massive; friable: medium acid.

Trempe series

The Trempe series consists of somewhat excessively drained Brunizems that are intergrading to the Regosol great soil group. The soils formed in very sandy materials, chiefly from sandstone of Cambrian age. The parent materials were deposited by water. These soils occur on the lowest outwash benches along the major drainageways. They are closely associated with the Sparta and Plainfield soils. The Trempe soils differ from the Sparta soils in having formed in reddish, sandy outwash and in having redder hues throughout the profile.

They differ from the Plainfield soils in having a thicker, darker surface layer and a redder subsoil and substratum.

Profile of an undisturbed area of a Trempe loamy fine sand (SW¼NE¼SE¼ sec. 9, T. 24 N., R. 10 W.):

A_1 0 to 14 inches, dark reddish-brown (5YR 2/2 to 5YR 3/2) loamy fine sand; weak, fine, subangular blocky structure that breaks readily to weak, fine granules; very friable when moist; grass roots abundant; strongly acid; clear, wavy boundary.

A_3 14 to 24 inches, dark reddish-brown (5YR 3/3) loamy fine sand; weak, medium, subangular blocky structure that breaks to weak, fine granules; very friable when moist, loose when dry; a few roots of grasses and oaks; medium acid; clear, wavy boundary.

C_1 24 to 30 inches, dark reddish-brown (5YR 3/4 fine sand; single grain; loose; strongly acid; gradual boundary.

C_2 30 to 60 inches, yellowish-red (5YR 4/6) medium sand; single grain; loose; some evidence of stratification; strongly acid.

Urne series

The Urne series consists of excessively drained, shallow soils of the Lithosol great soil group. The soils formed mainly in materials from fine-grained sandstone of Cambrian age (Franconia formation). In places the parent material included a small admixture of Peorian loess. These soils occur on steep plains and on convex valley slopes in the Driftless Area. They have an AC profile and are slightly acid to neutral.

The Urne soils are associated with the Gale, Hixton, and Norden soils. They have been less influenced by loess than the Gale soils and lack the well-developed B horizon of those soils. Their profile is not so well developed as that of the Hixton soils, and they are underlain by finer textured sandstone. The Urne soils formed in the same kind of parent materials as the Norden soils, but the Norden soils have a well-developed textural and structural B horizon.

Profile of a virgin area of Urne loam (SE¼SE¼ sec. 24, T. 24 N., R. 13 W.):

A_{00} and A_0 ½ to 0 inch, partly decomposed mat consisting of oak leaves, twigs, and grasses.

A_1 0 to 2 inches, black (10YR 2/1) to very dark brown (10YR 2/2) loam; moderate, fine, granular structure; very friable; plant roots abundant; neutral; clear, smooth boundary.

A_2 2 to 9 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; plant roots plentiful; many fragments of sandstone; neutral; gradual, wavy boundary.

C_1 9 to 24 inches, olive-brown (2.5Y 4/4) very fine sandy loam; massive; very friable; few tree roots; many fragments of sandstone; neutral; clear, wavy boundary.

C_2 24 inches +, variable brownish, fine-grained sandstone with a greenish cast from glauconitic material; slightly alkaline.

Wallkill series

The Wallkill series is made up of poorly drained Alluvial soils of bottom lands. The soils have formed in recent, silty, alluvial or colluvial material that overlies peat or muck. The silty material has washed onto the areas from uplands and terraces. In most places the Wallkill soils form a fringe or margin between areas of peat and muck on bottom lands and uplands or terraces along streams.

Near the areas of peat and muck, the mineral deposits are approximately 18 inches thick. In the areas next to uplands or along stream terraces, however, they are as much as 42 inches thick. The silty material is neutral to slightly acid, and the underlying peat or muck is neutral to moderately alkaline.

Profile of a Wallkill silt loam (SE¼SE¼ sec. 12, T. 24 N., R. 12 W.):

A_{11} 0 to 9 inches, dark-gray (10YR 4/1) silt loam; moderate, medium, platy structure in upper part ranging to moderate, medium, subangular blocky structure in the lower part; very friable; the layered effect caused by deposition by water; many, medium, distinct mottles of yellowish brown (10YR 5/6), reddish brown (5YR 4/4), and reddish gray (5YR 5/2); roots plentiful; neutral; gradual boundary.

A_{12} 9 to 22 inches, dark-gray (10YR 4/1) to gray (10YR 5/1) silt loam; moderate, medium, platy structure; very friable; many, distinct, medium mottles of yellowish brown (10YR 5/6), reddish brown (5YR 4/4), and reddish gray (5YR 5/2); roots few; contains small woody fragments (probably tamarack) and has streaks and tongues of mucky peat throughout; slightly acid; abrupt; irregular boundary.

D 22 inches +, black (2.5Y 2/0) mucky peat; weak, thick, platy structure in place; friable; contains many fine, fibrous plant remains that are dark grayish brown (10YR 4/2) and old root channels of sedges running vertically throughout the horizon; also has vertical tongues and streaks of yellowish-brown (10YR 5/6) and grayish-brown (2.5Y 5/2) silt in upper part; many small pieces of wood (probably tamarack) are scattered throughout; the peat breaks down readily to a mucky consistence if disturbed when it is moist; in spoilbanks along drainage ditches, it dries in large fibrous blocks; no plant roots; moderately alkaline.

Waukegan series

The Waukegan series consists of well-drained soils of the Brunizem great soil group. The soils have formed in a mantle of loess that overlies stratified sand and gravel at a depth of 24 to 42 inches. The soils are on nearly level to gently undulating terraces along streams. The Waukegan soils are closely associated with the Richwood and Dakota soils. They are shallower over sand than the Richwood soils and have a silty texture rather than being loamy like the Dakota soils. The Waukegan soils are similar to the Tell soils, but their A horizon is generally thicker and darker than that of the Tell soils.

In Buffalo County the Waukegan soils are fairly uniform. They most commonly range in thickness from about 32 to 36 inches. The substratum in most places consists of stratified sand, but in a few areas the soils are underlain by gravelly layers.

Profile of a Waukegan silt loam (SE¼SE¼ sec. 35, T. 22 N., R. 11 W.):

A_p 0 to 8 inches, very dark gray (10YR 3/1) to black (10YR 2/1) silt loam; weak, medium, subangular blocky structure that breaks to moderate, medium, granular; very friable; roots abundant; neutral; clear, smooth boundary.

B_1 8 to 14 inches, dark-brown (10YR 4/3) silt loam; weak, medium, platy structure that breaks to fine, subangular blocks; friable; tongues and streaks of staining from organic matter carried down from the surface; roots plentiful; neutral; gradual, wavy boundary.

B_2 14 to 24 inches, dark yellowish-brown (10YR 4/4), heavy silt loam; moderate, medium, subangular blocky structure; moderately vesicular; friable; tongues and streaks of staining from organic matter carried down from the surface; roots plentiful; medium acid; gradual, wavy boundary.

B_3 24 to 32 inches, dark yellowish-brown (10YR 4/4) loam; moderate, fine to medium, subangular blocky structure; friable; roots plentiful; strongly acid; gradual, smooth boundary.

D 32 to 36 inches, dark-brown (10YR 4/3) fine sand; single grain; loose; lenses of sandy loam and loamy fine sand and balls of sandy loam at a depth below 36 inches; medium acid.

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Glossary

AC soil. A soil that has a profile containing only A and C horizons and no distinct B horizon.

Acidity. The degree of acidity or alkalinity of a soil mass technically expressed in pH values, or in words, as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4–7.8
Very strongly acid	4.5–5.0	Moderately alkaline	7.9–8.4
Strongly acid	5.1–5.5	Strongly alkaline	8.5–9.0
Medium acid	5.6–6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1–6.5		
Neutral	6.6–7.3		

Aggregate, soil. A mass or cluster of many soil particles held together, such as a granule, clod, block, or prism.

Alluvium (alluvial deposits). Soil materials deposited on land by streams.

Alluvial soils. A great group of soils of the azonal order. The soils are forming in material recently deposited by water. The soil-forming processes have modified the material little or none, and, consequently, the soils have little profile development.

Base-exchange capacity. A measure of the adsorptive capacity of a soil for bases, or the amount of bases that can be absorbed by a given amount of soil, expressed in terms of milliequivalents of monovalent cation absorbed from a neutral solution by 100 grams of soil. Generally speaking, a soil with a fairly high exchange capacity is preferred to one with a low exchange capacity because it will retain more plant nutrients and will be less subject to leaching.

Blowout. An area of soil from which most, or all, of the fine soil material has been removed by wind. Such an area appears as a shallow depression with a flat or irregular floor consisting of a resistant layer or accumulation of pebbles. The soil is usually bare. Blowouts are common near dunes.

Boron. An element necessary for the growth of plants, especially alfalfa and other legumes.

Bottom land. Nearly level areas along streams. They are subject to flooding and are often referred to as flood plains.

Catena, soil. A group of soils within one zonal area, formed from similar parent material, but differing in profile characteristics because of differences in relief or drainage.

Chert. A structureless form of silica, closely related to flint, which breaks into angular fragments.

Clay. (1) As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. (2) As a soil textural class, soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium (colluvial deposits). Mixed deposits of rock fragments and coarse soil materials near the bases of steep slopes. The deposits have accumulated as the result of soil creep, slides, or local wash.

Consistence, soil. The nature of soil material that is expressed by the resistance of the individual particles to separating from one another (cohesion) or by the ability of the soil mass to undergo a change in shape without breaking (plasticity). The consistence varies with the content of moisture. Wet consistency is determined at or slightly above field capacity. Terms used to describe consistence when the soil is moist or dry are—

Friable. When moist, easily crushed by hand and coheres when pressed together. Friable soils are easily tilled.

Firm. When moist, crushes under moderate pressure, but resistance is distinctly noticeable. Firm soils are likely to be difficult to till.

Hard. When dry, is moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and finger.

Loose. Noncoherent when moist or dry. Loose soils are generally coarse textured and are easily tilled.

Soft. Weakly coherent and fragile; when dry, breaks to powder or individual grains under slight pressure.

Terms used to describe consistence of the soil when wet are—

Nonsticky. After release of pressure, practically no soil material adheres to thumb or finger.

Slightly sticky. After pressure, soil material adheres to both thumb and finger but comes off one or the other rather cleanly. It is not appreciably stretched when the digits are separated.

Sticky. After pressure, soil material adheres to both thumb and finger and tends to stretch somewhat and pull apart rather than pulling free from either digit.

Very sticky. After pressure, soil material adheres strongly to both thumb and finger and is decidedly stretched when the fingers are separated.

Nonplastic. No wire is formable.

Slightly plastic. Wire formable, but soil mass easily deformable.

Plastic. Wire formable and moderate pressure required for deformation of the soil mass.

Very plastic. Wire formable and much pressure required for deformation of the soil mass.

Contour stripcropping. The growing of crops in comparatively narrow strips, planted on the contour and at right angles to the natural direction of slope. Usually, strips in grass or in a close-growing crop are alternated with strips in cultivated crops.

Crop residue. That part of a plant, or crop, left in the field after harvest.

Depressions. Low-lying areas that have no surface outlets or only poor outlets to drain off the water that accumulates.

Dissected. Cut by streams.

Diversion. A broad-bottomed ditch constructed to divert runoff water so that it will flow around the slope to a safe outlet.

Dolomite. A rock that contains a high proportion of calcium and magnesium carbonates. Ground dolomitic limestone that contains a large amount of magnesium carbonate, as well as calcium carbonate, is widely used as agricultural lime, especially on soils that are low in magnesium.

Dune. A mound or ridge of loose sand piled up by the wind; common where sand is abundant and the wind is usually strong, as along the shores of lakes and the sea and in some desert and semidesert areas.

Fine sandy loam. See Texture.

Genesis, soil. Mode of origin of the soil. Soil genesis refers particularly to the processes that cause the solum to develop from unconsolidated parent material.

Granular. See Structure, soil.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, that has characteristics produced by soil-forming processes. The relative positions of the several soil horizons in the soil profile and their nomenclature are given below:

Horizon A. The master horizon consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and have lost clay minerals, iron, and aluminum with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of these categories.

Horizon B. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic material; or (2) a horizon in which the soil material has blocky or prismatic structure together with other characteristics, such as stronger colors, unlike those of the A horizon or the underlying horizons of nearly unchanged material; or (3) characteristics of both of these categories. Commonly, the lower limit of the B horizon corresponds to the lower limit of the solum.

Horizon C. A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a part of the overlying solum has developed.

Horizon D. Any stratum underlying the C, or the B if no C is present, which is unlike the material from which the solum has formed.

Humus. Organic matter that has reached a more or less stable advanced stage of decomposition.

Loess. Geological deposit of fairly uniform, fine material, mostly silt, presumably transported by wind.

Mapping unit. Any area enclosed by a boundary and identified by a symbol on the soil map.

Morphology, soil. The physical constitution of the soil including the texture, structure, consistence, color, and other physical and chemical properties of the various soil horizons that make up the soil profile.

Mottled. Marked with spots of color and usually associated with poor drainage. Descriptive terms for mottles follow: Contrast—*faint, distinct,* and *prominent;* abundance—*few, common,* and *many;* and size—*fine, medium,* and *coarse.* The size measurements are as follows: *Fine,* commonly less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* commonly ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) along the greatest dimension; and *coarse,* commonly more than 15 millimeters (about 0.6 inch) along the greatest dimension.

Outwash, glacial. A broad term that includes all of the material swept out, sorted, and deposited beyond the glacial ice front by streams of melt water. Commonly, this outwash exists in the form of plains, valley trains, or deltas in old glacial lakes. In places the valley trains of outwash extend far beyond the farthest advance of the ice.

Parent material. The horizon of weathered rock or of partly weathered soil material from which the soil formed. Horizon C of the soil profile.

Permeability, soil. That quality of the soil that enables it to transmit air and water. Moderately permeable soils transmit air and water readily. Such conditions are favorable for the growth of roots. Slowly permeable soils allow air and water to move so slowly that the growth of roots may be restricted. Rapidly permeable soils transmit air and water rapidly. If other factors are favorable, the growth of roots is good.

Phase, soil. A subdivision of a soil type, other than one based on kind, thickness, and arrangement of layers. Steepness or character of slope, number of rock outcrops, degree of erosion, depth of soil over the substratum, and natural drainage are all examples of characteristics that suggest dividing a soil type into phases.

Plant nutrients. The elements or groups of elements taken in by the plant, which are essential to its growth and are used by it in the elaboration of its food and tissues. Includes nutrients obtained from the ingredients of fertilizer.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See also Horizon, soil.

Relief. Elevations or inequalities of the land surface, considered collectively.

Renovation. Method of restoring a field used for pasture or hay to higher productivity by cultivating carefully, usually with a field cultivator or similar tool, so that the tillage will not cause erosion. The soil is then, limed, fertilized, and reseeded with a suitable grass-legume mixture.

Series, soil. A group of soils that have genetic horizons that are similar, except for the texture of the surface soil, as to differentiating characteristics and arrangement in the soil profile, and formed from a particular kind of parent material. A soil series may consist of two or more soil types that differ from one another in the texture of the surface soil.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of or arranged in strata, or layers, such as stratified alluvium. The term is confined to geological materials. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of the soil particles into lumps, granules, or other aggregates. Structure is described by grade (weak, moderate, or strong), that is, the distinctness and durability of the aggregates; by the size of the aggregates (very fine, medium, coarse, or very coarse); and by their shape (platy, prismatic, columnar, blocky, granular, or crumb). A soil is described as structureless if there are no observable aggregates. Structureless soils may be massive (coherent) or single grain (noncoherent).

Blocky, angular. Aggregates are block shaped: they may have flat or rounded surfaces, which join at sharp angles.

Blocky, subangular. Aggregates have some rounded and some plane surfaces; vertices are rounded.

Columnar. Aggregates are prismatic and are rounded at the upper ends.

Crumb. Generally, soft, small, porous aggregates; irregular, but tending toward a spherical shape, as in the A_1 horizon of many soils. Crumb structure is closely related to granular structure.

Granular. Roughly spherical, firm, small aggregates that may be either hard or soft but that are generally firmer than crumb and without the distinct faces of blocky structure.

Platy. Soil particles are arranged around a plane that normally is horizontal.

Prismatic. Soil particles are arranged around a vertical line; aggregates have flat, vertical surfaces.

Subsoil. Technically, the B horizon of soils with distinct profiles; roughly, that part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil. See also Horizon, soil; Parent material.

Surface soil. Technically, the A horizon; commonly, the upper part of the profile usually stirred by plowing.

Terrace, stream. A nearly flat or undulating plain, formerly the flood plain of a stream. It is commonly rather narrow, generally has a steep front, and borders a river, lake, the sea, or areas of bottom lands.

Terracing. Construction of shallow, nearly level ditches with broad slopes that can be farmed. Terraces are used on slopes to control runoff water.

Texture. The relative proportions of the various size groups of individual soil grains in a mass of soil; specifically, the proportions of sand, silt, and clay. The classes of soil texture, in increasing order of the content of the finer separates, are as follows: Sand, loamy sand, sandy loam, loam, silt loam, and clay. These classes may be modified according to the relative size of the coarser particles; for example, fine sand, loamy fine sand, fine sandy loam, very fine sandy loam, coarse sandy loam, gravelly sandy loam, gravelly loam, cobbly loam, sandy clay, stony clay, and stony loam.

Tilth, soil. The condition of the soil in its relation to the growth of plants, especially soil structure. A friable soil has good tilth. It has stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Type, soil. A subdivision of the soil series based on the texture of the surface soil.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than an alluvial plain or stream terrace.

Vesicular. A term used to describe small openings or pores within the structural aggregates of a soil.

GUIDE TO MAPPING UNITS[1]

[1] Table 2, p. 8, shows the acreage and proportionate extent of the soils; table 3, p. 44, gives estimated yields of crops; and table 4, p. 50, gives estimated yields of wood products. To find the engineering properties of the soils, see section beginning p. 49.

GUIDE TO MAPPING UNITS[1]—Continued

Map symbol	Soil	Page	Capability unit	Page
FvC	Fayette silt loam, valleys, 6 to 12 percent slopes	19	IIIe-1	37
FvC2	Fayette silt loam, valleys, 6 to 12 percent slopes, moderately eroded	19	IIIe-1	37
FvC3	Fayette silt loam, valleys, 6 to 12 percent slopes, severely eroded	19	IVe-1	39
FvD	Fayette silt loam, valleys, 12 to 20 percent slopes	19	IVe-1	39
FvD2	Fayette silt loam, valleys, 12 to 20 percent slopes, moderately eroded	19	IVe-1	39
FvD3	Fayette silt loam, valleys, 12 to 20 percent slopes, severely eroded	19	VIe-1	41
FvE	Fayette silt loam, valleys, 20 to 30 percent slopes	19	VIe-1	41
FvE2	Fayette silt loam, valleys, 20 to 30 percent slopes, moderately eroded	19	VIe-1	41
FvE3	Fayette silt loam, valleys, 20 to 30 percent slopes, severely eroded	19	VIIe-1	42
GaB2	Gale silt loam, 2 to 6 percent slopes, moderately eroded	20	IIe-2	35
GaC2	Gale silt loam, 6 to 12 percent slopes, moderately eroded	20	IIIe-2	37
GaC3	Gale silt loam, 6 to 12 percent slopes, severely eroded	20	IVe-2	40
GaD	Gale silt loam, 12 to 20 percent slopes	20	IVe-2	40
GaD2	Gale silt loam, 12 to 20 percent slopes, moderately eroded	20	IVe-2	40
GaD3	Gale silt loam, 12 to 20 percent slopes, severely eroded	20	VIe-1	41
GaE	Gale silt loam, 20 to 30 percent slopes	20	VIe-1	41
GaE2	Gale silt loam, 20 to 30 percent slopes, moderately eroded	20	VIe-1	41
GaE3	Gale silt loam, 20 to 30 percent slopes, severely eroded	20	VIIe-1	42
GfC2	Norden silt loam, 6 to 12 percent slopes, moderately eroded	27	IIIe-1	37
GfD	Norden silt loam, 12 to 20 percent slopes	27	IVe-1	39
GfD2	Norden silt loam, 12 to 20 percent slopes, moderately eroded	27	IVe-1	39
GfD3	Norden silt loam, 12 to 20 percent slopes, severely eroded	27	VIe-1	41
GfE	Norden silt loam, 20 to 30 percent slopes	27	VIe-1	41
GfE2	Norden silt loam, 20 to 30 percent slopes, moderately eroded	27	VIe-1	41
GfE3	Norden silt loam, 20 to 30 percent slopes, severely eroded	27	VIIe-1	42
GoA	Gotham loamy fine sand, 0 to 2 percent slopes	21	IVs-3	40
GoB	Gotham loamy fine sand, 2 to 6 percent slopes	20	IVs-3	40
GoB2	Gotham loamy fine sand, 2 to 6 percent slopes, eroded	20	IVs-3	40
Gr	Granby sandy loam	21	IIIw-5	38
Gs	Granby fine sandy loam, stratified substratum variant	21	IIIw-5	38
Gu	Gullied land	21	VIIe-1	42
HcB	Hesch fine sandy loam, 2 to 6 percent slopes	22	IIIs-2	38
HcC2	Hesch fine sandy loam, 6 to 12 percent slopes, moderately eroded	22	IVe-7	40
HcD2	Hesch fine sandy loam, 12 to 20 percent slopes, moderately eroded	22	VIe-1	41
HcE	Hesch fine sandy loam, 20 to 30 percent slopes	22	VIIe-1	42
HcE2	Hesch fine sandy loam, 20 to 30 percent slopes, moderately eroded	22	VIIe-1	42
HeC2	Hesch loam, 6 to 12 percent slopes, moderately eroded	22	IIIe-2	37
HeD2	Hesch loam, 12 to 20 percent slopes, moderately eroded	21	IVe-2	40
HeE	Hesch loam, 20 to 30 percent slopes	22	VIe-1	41
HeE2	Hesch loam, 20 to 30 percent slopes, moderately eroded	22	VIe-1	41
HfB2	Hixton fine sandy loam, 2 to 6 percent slopes, moderately eroded	23	IIIs-2	38
HfC2	Hixton fine sandy loam, 6 to 12 percent slopes, moderately eroded	23	IVe-7	40
HfC3	Hixton fine sandy loam, 6 to 12 percent slopes, severely eroded	23	IVe-2	40
HfD	Hixton fine sandy loam, 12 to 20 percent slopes	23	VIe-1	41
HfD2	Hixton fine sandy loam, 12 to 20 percent slopes, moderately eroded	23	VIe-1	41
HfD3	Hixton fine sandy loam, 12 to 20 percent slopes, severely eroded	23	VIIe-1	42
HsB	Hixton loam, 2 to 6 percent slopes	22	IIe-2	35
HsB2	Hixton loam, 2 to 6 percent slopes, moderately eroded	22	IIe-2	35
HsC	Hixton loam, 6 to 12 percent slopes	22	IIIe-2	37
HsC2	Hixton loam, 6 to 12 percent slopes, moderately eroded	22	IIIe-2	37
HsC3	Hixton loam, 6 to 12 percent slopes, severely eroded	22	IVe-2	40
HsD	Hixton loam, 12 to 20 percent slopes	22	IVe-2	40
HsD2	Hixton loam, 12 to 20 percent slopes, moderately eroded	22	IVe-2	40
HsD3	Hixton loam, 12 to 20 percent slopes, severely eroded	22	VIe-1	41
HtE	Hixton loam and fine sandy loam, 20 to 30 percent slopes	23	VIe-1	41
HtE2	Hixton loam and fine sandy loam, 20 to 30 percent slopes, moderately eroded.	23	VIe-1	41
HtE3	Hixton loam and fine sandy loam, 20 to 30 percent slopes, severely eroded.	23	VIIe-1	42
HtF	Hixton loam and fine sandy loam, 30 to 40 percent slopes	23	VIIe-1	42
HtF2	Hixton loam and fine sandy loam, 30 to 40 percent slopes, moderately eroded.	23	VIIe-1	42
HuA	Hubbard soils, 0 to 2 percent slopes	23	IIIs-2	38
HuB	Hubbard soils, 2 to 6 percent slopes	24	IVs-3	40
Hv	Huntsville silt loam	24	IIw-11	37
JaA	Jackson silt loam, 0 to 2 percent slopes	24	I-1	34
JaB	Jackson silt loam, 2 to 6 percent slopes	24	IIe-1	35
JaB2	Jackson silt loam, 2 to 6 percent slopes, moderately eroded	24	IIe-1	35
JuA	Judson silt loam, 0 to 2 percent slopes	24	IIw-11	37
JuB	Judson silt loam, 2 to 6 percent slopes	24	IIw-11	37
JuC	Judson silt loam, 6 to 12 percent slopes	25	IIIe-1	37
LsC	Lindstrom silt loam, 6 to 12 percent slopes	25	IIIe-1	37
LsC2	Lindstrom silt loam, 6 to 12 percent slopes, moderately eroded	25	IIIe-1	37
LsD2	Lindstrom silt loam, 12 to 20 percent slopes, moderately eroded	25	IVe-1	39
LsE	Lindstrom silt loam, 20 to 30 percent slopes	25	VIe-1	41

GUIDE TO MAPPING UNITS[1]—Continued

Map symbol	*Soil*	*Page*	*Capability unit*	*Page*
LsE2	Lindstrom silt loam, 20 to 30 percent slopes, moderately eroded	25	VIe–1	41
Lv	Loamy alluvial land, poorly drained	25	Vw–15	41
Lw	Loamy alluvial land	25	IIIw–14	39
Ma	Marsh	25	VIIIw–1	43
MdA	Medary silt loam, 0 to 2 percent slopes	25	IIw–2	36
MdB2	Medary silt loam, 2 to 6 percent slopes, moderately eroded	26	IIe–1	35
MeA	Meridian fine sandy loam, 0 to 2 percent slopes	26	IIIs–2	38
MeB	Meridian fine sandy loam, 2 to 6 percent slopes	26	IIIs–2	38
MeB2	Meridian fine sandy loam, 2 to 6 percent slopes, moderately eroded	26	IIIs–2	38
MeC2	Meridian fine sandy loam, 6 to 12 percent slopes, moderately eroded	26	IVe–7	40
MmA	Meridian loam, 0 to 2 percent slopes	26	IIs–1	36
MmB	Meridian loam, 2 to 6 percent slopes	26	IIe–2	35
MmB2	Meridian loam, 2 to 6 percent slopes, moderately eroded	26	IIe–2	35
MmC2	Meridian loam, 6 to 12 percent slopes, moderately eroded	26	IIIe–2	37
MnA	Meridian loam, moderately well drained variant, 0 to 2 percent slopes	26	IIs–1	36
MnB	Meridian loam, moderately well drained variant, 2 to 6 percent slopes	27	IIe–2	35
NfB2	Norden fine sandy loam, 2 to 6 percent slopes, moderately eroded	27	IIe–2	35
NfC2	Norden fine sandy loam, 6 to 12 percent slopes, moderately eroded	28	IIIe–2	37
NfD	Norden fine sandy loam, 12 to 20 percent slopes	28	IVe–2	40
NfD2	Norden fine sandy loam, 12 to 20 percent slopes, moderately eroded	27	IVe–2	40
NfD3	Norden fine sandy loam, 12 to 20 percent slopes, severely eroded	28	VIe–1	41
NoC	Norden loam, 6 to 12 percent slopes	27	IIIe–2	37
NoC2	Norden loam, 6 to 12 percent slopes, moderately eroded	27	IIIe–2	37
NoD2	Norden loam, 12 to 20 percent slopes, moderately eroded	27	IVe–2	40
NoE2	Norden loam, 20 to 30 percent slopes, moderately eroded	27	VIe–1	41
Or	Orion silt loam	28	IIIw–14	39
Pa	Peat and Muck, shallow	28	Vw–15	41
Pd	Peat and Muck, deep	28	IIIw–9	39
PfA	Plainfield loamy fine sand, 0 to 2 percent slopes	28	IVs–3	40
PfB	Plainfield loamy fine sand, 2 to 6 percent slopes	28	IVs–3	40
PfB2	Plainfield loamy fine sand, 2 to 6 percent slopes, eroded	28	IVs–3	40
PfC2	Plainfield loamy fine sand, 6 to 12 percent slopes, eroded	28	VIs–3	42
Ps	Plainfield loamy fine sand, loamy substrata variant	28	IVs–3	40
RcA	Richwood silt loam, 0 to 2 percent slopes	29	I–1	34
RcB	Richwood silt loam, 2 to 6 percent slopes	29	IIe–1	35
RcC2	Richwood silt loam, 6 to 12 percent slopes, moderately eroded	29	IIIe–1	37
Re	Riverwash	29	VIIIs–1	43
Ro	Rowley silt loam	29	IIw–1	36
Sa	Sandy alluvial land, poorly drained	29	Vw–15	41
Sd	Sandy alluvial land	29	IVw–14	41
SpA	Sparta loamy fine sand, 0 to 2 percent slopes	30	IVs–3	40
SpB	Sparta loamy fine sand, 2 to 6 percent slopes	30	IVs–3	40
SpB2	Sparta loamy fine sand, 2 to 6 percent slopes, eroded	30	IVs–3	40
SpC	Sparta loamy fine sand, 6 to 12 percent slopes	30	VIs–3	42
SpC2	Sparta loamy fine sand, 6 to 12 percent slopes, eroded	30	VIs–3	42
Sr	Sparta loamy fine sand, loamy substrata variant	30	IVs–3	40
Ss	Sparta and Plainfield fine sands and Dune land	30	VIIs–6	43
St	Steep stony and rocky land	30	VIIs–6	43
TeA	Tell silt loam, 0 to 2 percent slopes	30	IIs–1	36
TeB	Tell silt loam, 2 to 6 percent slopes	30	IIe–2	35
Tm	Terrace escarpments, loamy	31	VIIe–1	42
Tn	Terrace escarpments, sandy	31	VIIs–6	43
ToA	Toddville silt loam, 0 to 2 percent slopes	31	I–1	34
ToB	Toddville silt loam, 2 to 6 percent slopes	31	IIe–1	35
TrA	Trempe loamy fine sand, 0 to 2 percent slopes	31	IVs–3	40
TrB	Trempe loamy fine sand, 2 to 6 percent slopes	31	IVs–3	40
TrB2	Trempe loamy fine sand, 2 to 6 percent slopes, eroded	31	IVs–3	40
TrC2	Trempe loamy fine sand, 6 to 12 percent slopes, eroded	31	VIs–3	42
UnE	Urne-Norden loams, 20 to 30 percent slopes	32	VIe–1	41
UnE2	Urne-Norden loams, 20 to 30 percent slopes, moderately eroded	32	VIe–1	41
UnF	Urne-Norden loams, 30 to 40 percent slopes	32	VIIe–1	42
UnF2	Urne-Norden loams, 30 to 40 percent slopes, moderately eroded	32	VIIe–1	42
Wa	Wallkill silt loam	32	IIIw–9	39
WkA	Waukegan silt loam, 0 to 2 percent slopes	32	IIs–1	36
WkB	Waukegan silt loam, 2 to 6 percent slopes	32	IIe–2	35

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