SOIL SURVEY OF

Rock Island County, Illinois

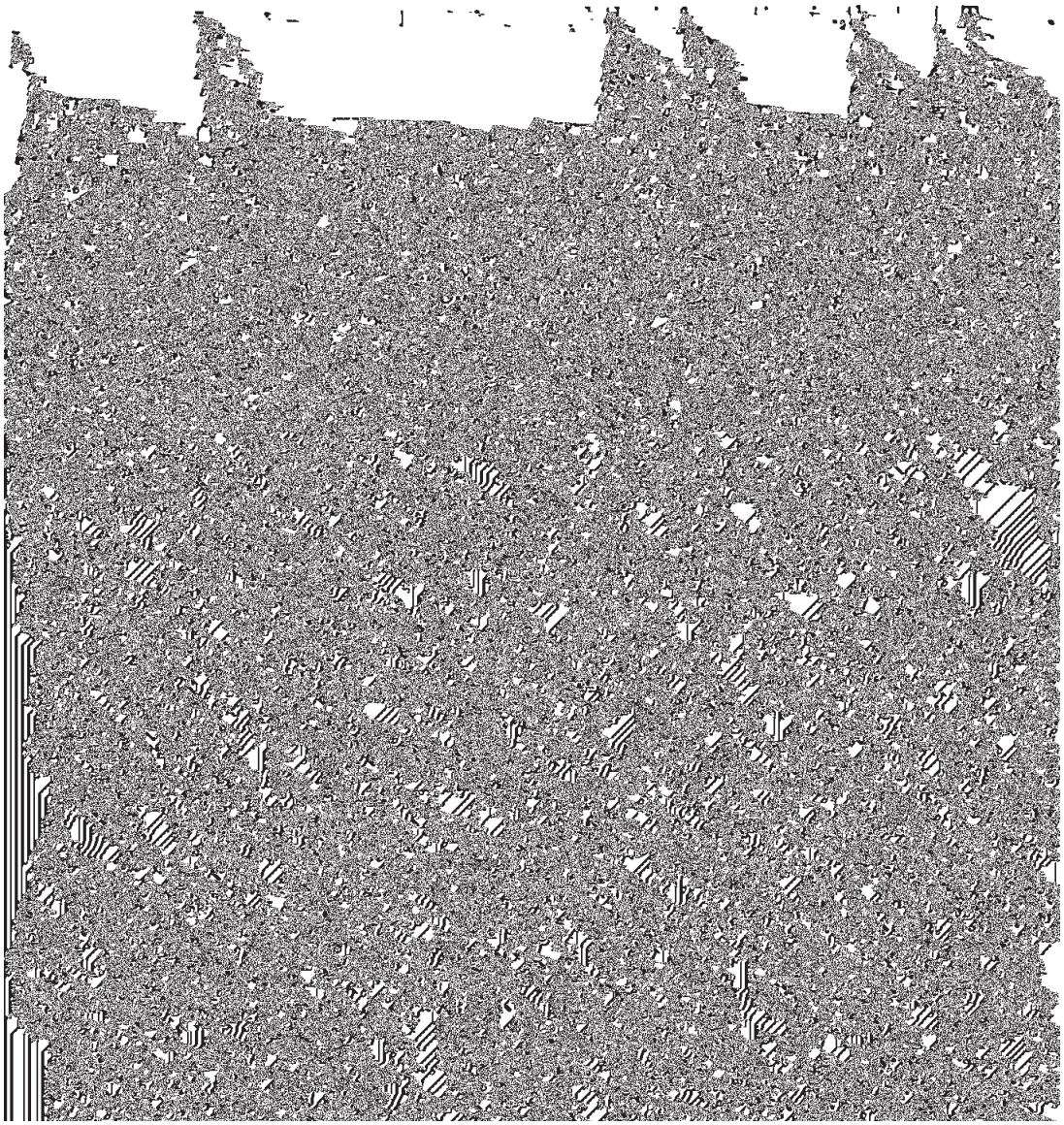
United States Department of Agriculture
Soil Conservation Service
in cooperation with
Illinois Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1966–71. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Rock Island County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale. This soil survey is Illinois Agricultural Experiment Station Soil Report No. 97.

HOW TO USE THIS SOIL SURVEY



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SOIL SURVEY OF ROCK ISLAND COUNTY, ILLINOIS

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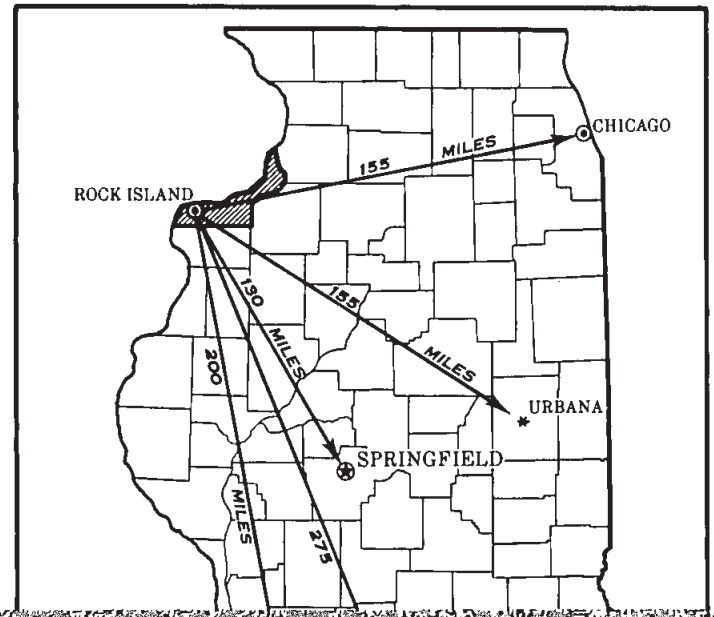
UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH ILLINOIS AGRICULTURAL EXPERIMENT STATION

ROCK ISLAND COUNTY is in the northwestern part of Illinois (fig. 1). It occupies 424 square miles and is bounded on the east by Whiteside and Henry Iowa. The City of Rock Island is the county seat and is one of the major cities of the Quad-City complex.



General Nature of the County

This section describes the relief and climate of Rock Island County and gives some facts about settlement, industry, and farming.

Relief, Physiography, and Drainage[1]

Three main elements make up the topography of Rock Island County: upland plains, broad flood plains, and highly dissected valley sides. Although the county was covered by glaciers which greatly modified the preexisting landscape, the present topography is almost entirely the result of stream erosion. Thus the upland plains represent a gently rolling surface produced by glacial deposition, and the flood plains and dissected valley sides are the result of subsequent stream erosion.

The upland plains are at elevations of 750 to 790 feet between the Mississippi River and Copperas and Mill Creeks, are at about 800 feet south of Copperas and Mill Creeks, and are at about 700 feet in Coe Township at the northern end of the county. These areas are

Thunderstorm days average about 45 annually, half of these during the critical growing period (*3*). Hail-producing thunderstorms in the same locality average two annually and less than one per year during the critical summer months. Not all hailstorms have stones of sufficient size or quantity to produce extensive crop damage.

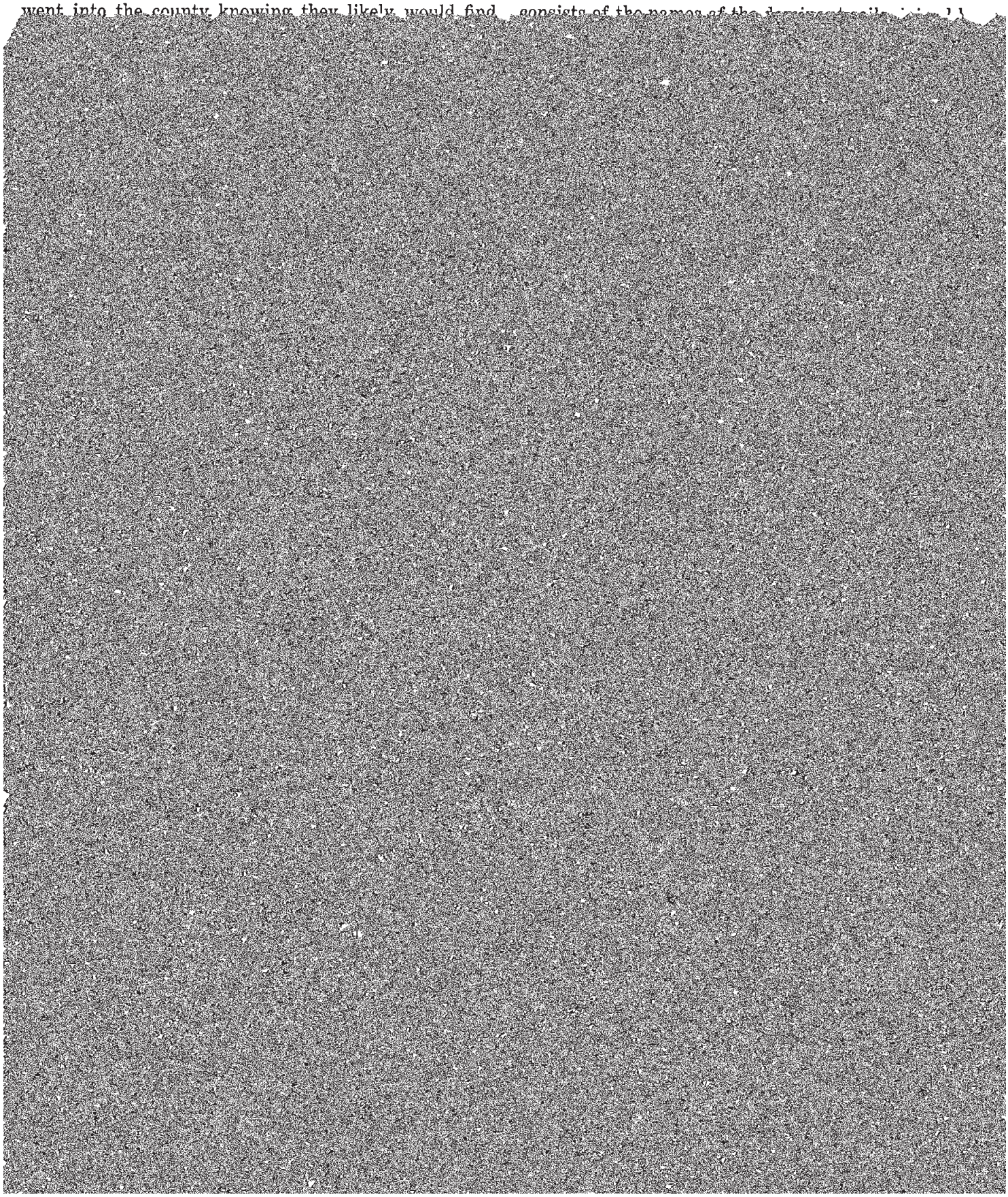
Annual snowfall averages about 28 inches. Nearly 20 inches has fallen in a single month on several occasions. About 50 inches fell during the winter of 1925–26, with measurable snowfall every month from October to April.

The number of days between the average date of the last freezing temperature (32° or lower) in spring and the average date of the first such occurrence in fall has been termed the "growing season." This averages approximately 173 days in Rock Island County. The "growing season" designation is misleading as different

tion, railway passenger service to the Quad-City area is also available. Facilities for loading commodities onto river barges are available along the Mississippi River. The Quad-City Airport offers connections to all points throughout the United States.

The Quad-Cities is considered the "tractor capital of the world." In addition to small industries located in the Quad-Cities is the U.S. Army Weapons Command, Rock Island Arsenal on Arsenal Island. Several limestone quarries and gravel pits provide crushed rock for roads, finely ground material for limestone application on fields, and sand and gravel for building materials. Hybrid seed corn is produced in the northern part of the county. Cordova Township also has a large industrial complex. The Nuclear Generating Station in Cordova Township provides power for much of east-central Iowa and northwestern Illinois in addition to generating power for the Chicago metropolitan region.

went into the county knowing they likely would find consists of the names of the



ments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The eight soil associations in Rock Island County are described on the following pages.

1. *Fayette-Sylvan-Hickory association*

Gently sloping to very steep, well drained and moderately well drained soils formed in loess or loamy glacial till; on uplands

This soil association is on gently sloping to strongly sloping convex ridgetops and strongly sloping to very steep valley sides. It makes up about 41 percent of the county. It is about 35 percent Fayette soils (fig. 2), 25 percent Sylvan soils, 10 percent Hickory soils, and 30 percent soils of minor extent.

The well-drained gently sloping to steep Fayette soils formed in loess. They are on convex ridgetops and valley sides. The ridgetops have slopes of 2 to 12 percent, and the valley sides slopes of 12 to 60 percent. The surface layer is mainly dark grayish-brown silt loam about 3 inches thick. The subsurface layer is dark grayish-brown to brown silt loam about 7 inches thick. The subsoil is silty clay loam about 50 inches thick. It is mainly dark yellowish brown and mottled in the lower part. The underlying material is dark yellowish-brown silt loam.

The well-drained, strongly sloping to very steep Sylvan soils are mainly on valley sides. They also formed in loess. The surface layer is very dark grayish-brown silt loam about 6 inches thick. The subsoil is silty clay loam about 24 inches thick. It is dark yellowish brown in the upper part and yellowish brown in the lower part. The underlying material is alkaline, yellowish-brown silt loam.

The moderately well drained to well drained, moderately steep to very steep Hickory soils are mainly on valley sides. They formed in till. The surface layer is grayish-brown silt loam about 3 inches thick. The subsurface layer is mainly yellowish-brown silt loam about 7 inches thick. The subsoil is about 38 inches thick. The upper 7 inches is mainly brownish-yellow silty clay loam. The next 10 inches is strong-brown silty clay loam over reddish-yellow clay. The lower 21 inches is brownish-yellow and olive-yellow clay loam. The underlying material is yellowish silt loam.

Minor soils in this association are the Downs, Rozetta, Stronghurst, Atterberry, and Orion soils. The well drained and moderately well drained, nearly level or gently sloping Downs and Rozetta soils are on ridgetops. In most places the somewhat poorly drained, nearly level Stronghurst and Atterberry soils are near

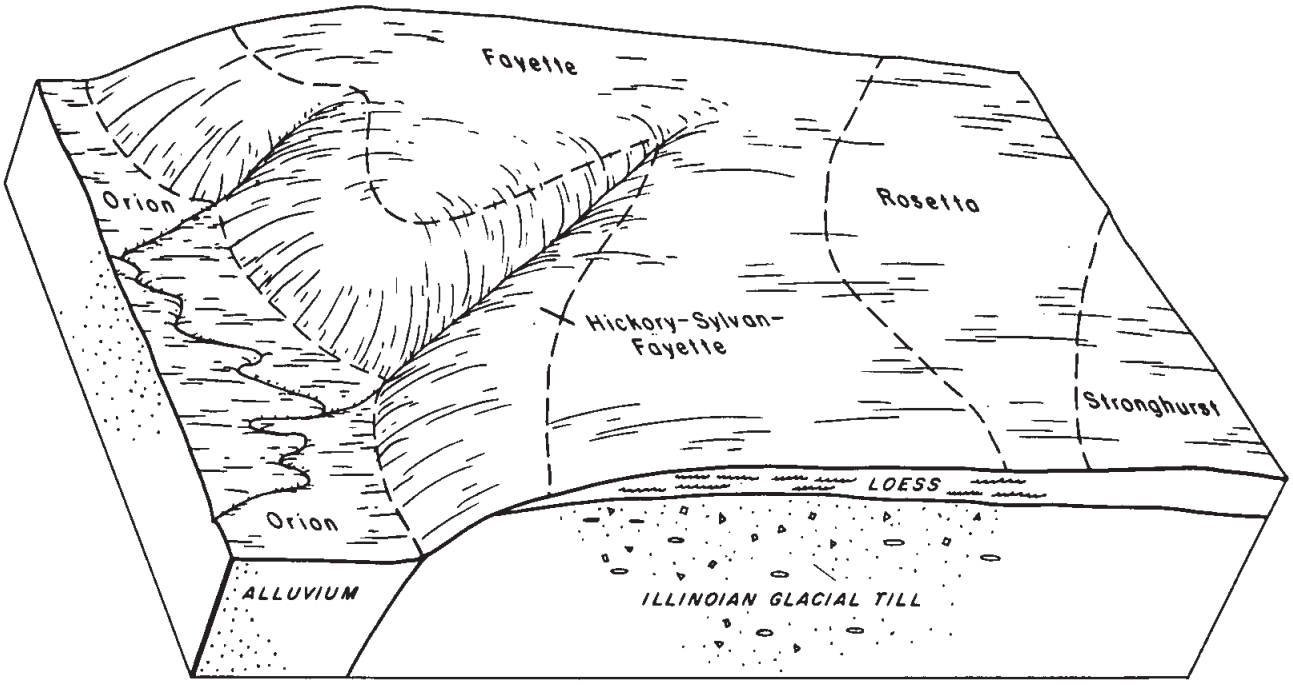


Figure 2.—**Pattern of soils and underlying material in the Fayette-Sylvan-Hickory association.**

the center of ridgetops. The somewhat poorly drained, nearly level Orion soils are on bottom lands. Also in this association are areas of Cut and fill land.

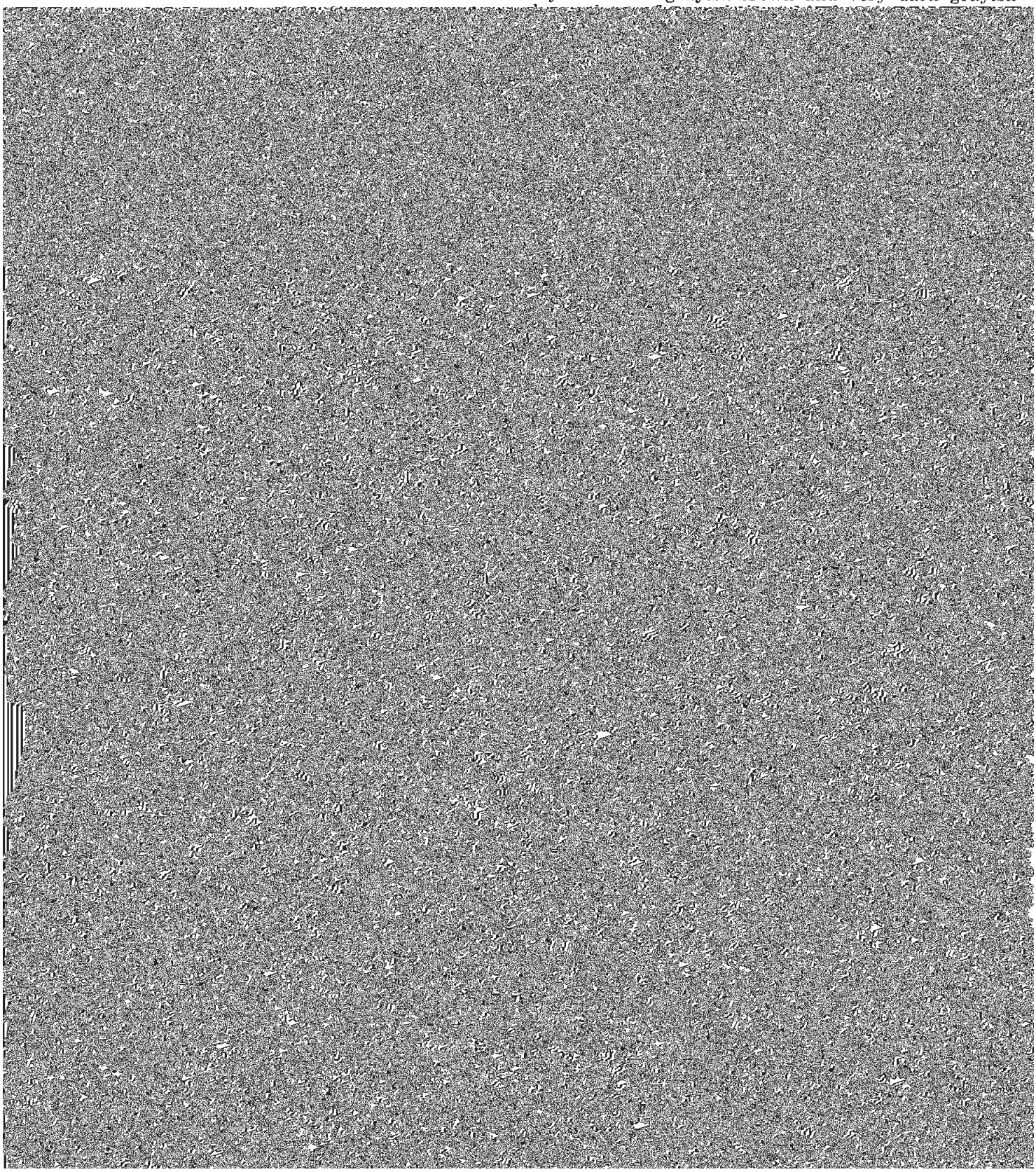
The nearly level to strongly sloping soils are used chiefly for cultivated crops and forage crops. Corn is the main crop, but soybeans, small grain, clover and

brownish-gray silty clay loam, and the lower 8 inches is light-gray to gray heavy silt loam. The subsoil has yellowish-brown mottles throughout. The underlying material is gray silt loam that has yellowish-brown mottles.

The well drained, nearly level to strongly sloping

erately well drained soils formed in loamy glacial till or in loamy glacial till and in the underlying weathered shale; on uplands

on dunes and valley sides. On dunes slopes are 4 to 30 percent, and on valley sides 4 to 60 percent. The surface layer is dark grayish-brown and very dark grayish-



and dark brown in the lower part. The subsoil is silt loam about 31 inches thick. The upper part is mixed dark brown and dark yellowish brown, and the lower part is dark brown and has brownish mottles. The underlying material is silt loam mottled with shades of brown.

The well-drained, strongly sloping to steep Timula soils formed in loess. They are mainly on valley sides. The surface layer is mainly dark grayish-brown silt loam about 7 inches thick. The subsoil is yellowish-brown silt loam about 13 inches thick. The underlying material is yellowish-brown, calcareous silt.

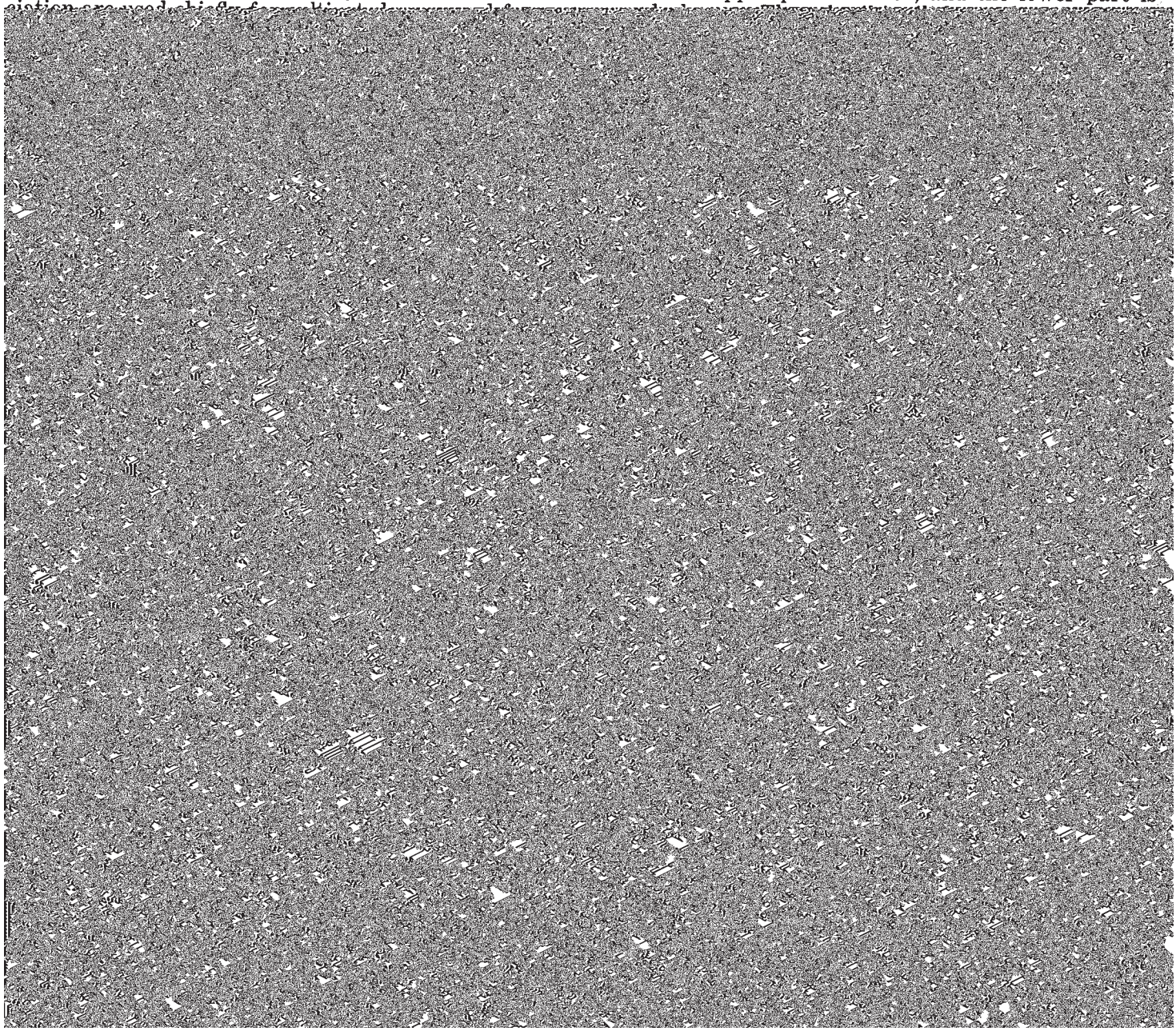
Minor in this association are the somewhat poorly drained, nearly level Joy soils on ridgetops. Limestone bedrock crops out on some steeper slopes along the northern edge of the association.

The nearly level to strongly sloping soils in this association are used chiefly for [illegible]

This soil association is on nearly level river bottom lands. It makes up about 21 percent of the county. It is about 15 percent Sawmill soils (fig. 4), 15 percent Coffeen soils, 10 percent Mixed alluvial land, and 60 percent soils of minor extent.

The poorly drained, nearly level Sawmill soils formed in silty alluvium. They are mainly on depressional bottom lands, The surface layer is about 32 inches thick. It is mainly black silty clay loam mottled with shades of brown. The subsoil is about 18 inches thick. It is gray silty clay loam mottled with strong brown and yellowish red. The underlying material is dark-gray silty clay loam mottled with olive and yellowish brown.

The somewhat poorly drained, nearly level Coffeen soils formed in silty alluvium. They are on bottom lands. The surface layer is silt loam about 19 inches thick. The upper part is black, and the lower part is



and parallel to the Mississippi and Rock Rivers. This land type is made up of alluvial soils. It is about 35 percent Dorchester silt loam, about 15 percent Raddle silt loam, and 50 percent Coffeen silt loam, Lawson silt loam, Landes loamy fine sand, Millington silt loam, and Otter silt loam.

Minor soils in this association are the Orion, Wabash, Dorchester, Millsdale, Hitt shallow variant, and Lawler soils. The somewhat poorly drained Orion soils, very poorly drained Wabash soils, and moderately well drained Dorchester soils are nearly level and are on bottom lands. The poorly drained Millsdale soils and the somewhat poorly drained Lawler soils are nearly level and are on the more poorly drained terraces. The well-drained Hitt shallow variant soils are nearly level to gently sloping soils that are on the better drained terraces. Also in this association are areas occupied by Canisteo, Saude, Burkhardt, and Waukee soils. Poorly drained, nearly level Niota and Canisteo soils are on the more poorly drained terraces. Well-drained, nearly level to gently sloping Waukee and Saude soils and somewhat excessively drained Burkhardt soils are on the better drained terraces.

The soils of this association are used chiefly for cultivated and forage crops. Corn and soybeans are the main crops, but small grains and alfalfa are also grown. Specialty crops can be grown if the soils are irrigated. Hogs and beef cattle are the main livestock. Droughtiness and erosion are the main concerns in management.

8. *Raddle-Joslin association*

Nearly level to moderately sloping, well drained and moderately well drained soils formed mainly in silty material; on terraces

mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless it is otherwise stated, the colors given in the descriptions are those of a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are of a soil series. Blown-out land, for example, does not belong to a soil series, but nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, woodland group, wildlife group, and recreation group to which the mapping unit has been assigned. The page for the description of each capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 3. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).

Atlas Series

The Atlas series consists of moderately steep to very steep, somewhat poorly drained soils on uplands. These soils formed partly in silty material and partly in the underlying buried soil. The native vegetation was hardwoods.

In a representative profile the surface layer is mainly dark-brown silt loam about 5 inches thick. The upper part of the subsoil is dark-brown and brown silty clay loam about 5 inches thick. The lower part is a buried soil about 59 inches thick. It is mainly grayish brown and is silty clay loam in the upper 10 inches and clay loam in the lower part.

Atlas soils are very slowly permeable and have high available water capacity. They are better suited to grasses, legumes, or trees than to other crops. Most slopes are too steep and too eroded to be suited to row crops.

Atlas soils in this county are mapped only in complexes with Hickory soils.

Representative profile of Atlas silt loam in an area of Hickory-Atlas complex, 18 to 30 percent slopes, severely eroded, at crest of east roadbank, 240 feet

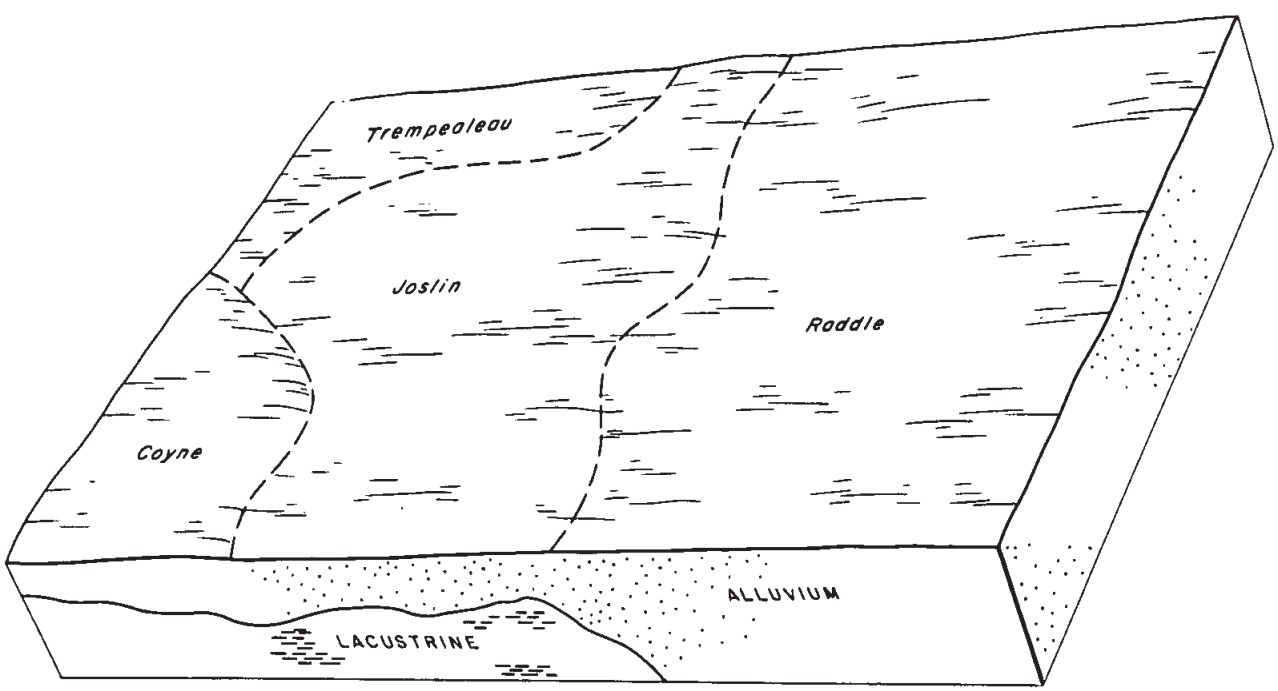


***Figure 5.*—Pattern of soils and underlying material in the Raddle-Joslin association.**

TABLE 3.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Atterberry silt loam	2,850	1.0
Blown-out land	413	.2
Borrow pit	300	.1
Burkhardt-Saude complex, 0 to 4 percent slopes	721	.3
Calco silty clay loam	902	.3
Calco silty clay loam, wet	389	.1
Canisteo silt loam	992	.4
Clayey terrace escarpments	74	(1)
Coffeen silt loam	6,345	2.3
Coyne fine sandy loam, 0 to 4 percent slopes	3,985	1.5
Coyne fine sandy loam, 4 to 12 percent slopes	459	.2
Cut and fill land	5,698	2.1
Denny silt loam	341	.1
Dickinson sandy loam, 0 to 4 percent slopes	3,407	1.3
Dickinson sandy loam, 4 to 12 percent slopes	186	.1
Dorchester silt loam	1,754	.6
Downs silt loam, 0 to 2 percent slopes	2,070	.8
Downs silt loam, 2 to 6 percent slopes	5,365	2.0
Elkhart silt loam, 7 to 12 percent slopes, eroded	1,211	.5
Elkhart silt loam, 12 to 18 percent slopes, eroded	678	.3
Fayette silt loam, 2 to 6 percent slopes	26,108	9.6
Fayette silt loam, 4 to 7 percent slopes, eroded	2,865	1.1
Fayette silt loam, 7 to 12 percent slopes, eroded	4,343	1.6
Fayette soils, 7 to 12 percent slopes, severely eroded	970	.4
Gravelly terrace escarpments	55	(1)
Gravel pit	226	.1
Hickory silt loam, 12 to 18 percent slopes, eroded	430	.2
Hickory silt loam, 18 to 30 percent slopes	3,183	1.2
Hickory soils, 12 to 18 percent slopes, severely eroded	1,143	.4
Hickory soils, 18 to 30 percent slopes, severely eroded	1,155	.4
Hickory-Atlas complex, 12 to 18 percent slopes, severely eroded	1,630	.6
Hickory-Atlas complex, 18 to 30 percent slopes, severely eroded	1,558	.6
Hickory-High Gap silt loams, 12 to 18 percent slopes, eroded	563	.2
Hickory-High Gap silt loams, 18 to 30 percent slopes	2,262	.8
Hickory-High Gap silt loams, 30 to 60 percent slopes	2,680	1.0
Hickory-Sylvan-Fayette silt loams, 12 to 18 percent slopes, eroded	5,193	1.9
Hickory-Sylvan-Fayette complex, 12 to 18 percent slopes, severely eroded	1,991	.7
Hickory-Sylvan-Fayette silt loams, 18 to 30 percent slopes	11,594	4.3
Hickory-Sylvan complex, 18 to 30 percent slopes, severely eroded	1,836	.5
Hickory-Sylvan silt loams, 30 to 60 percent slopes	7,949	2.9
Hitt loam, shallow variant, 0 to 4 percent slopes	521	.2
Hoopeston sandy loam	350	.1
Joslin silt loam, 0 to 2 percent slopes	1,400	.5
Joslin silt loam, 2 to 6 percent slopes	247	.1
Joy silt loam	509	.2
Lamont, Tell, and Bloomfield soils, 4 to 12 percent slopes, eroded	1,090	.4
Lamont, Tell, and Bloomfield soils, 12 to 30 percent slopes, eroded	226	.1
Landes loamy fine sand	581	.2
Lawler loam	547	.2
Lawson silt loam	4,813	1.8
Marsh	1,290	.5
Martinsville silt loam, 2 to 7 percent slopes	649	.2
Martinsville soils, 7 to 12 percent slopes, severely eroded	273	0.1
Martinsville soils, 12 to 18 percent slopes, severely eroded	436	.2
Millington silt loam	1,429	.5
Millington silt loam, wet	211	.1
Millsdale silty clay loam	578	.2
Mixed alluvial land	5,190	1.9
Montgomery silty clay loam	870	.3
Muscatine silt loam	14,000	5.2
Niota silt loam	1,098	.4
Oakville fine sand, 2 to 12 percent slopes	317	.1
Oakville fine sand, 12 to 60 percent slopes	360	.1
Orion silt loam	8,307	3.1
Otter silt loam	2,364	.9
Otter silt loam, wet	1,015	.4
Port Byron silt loam, 0 to 2 percent slopes	1,024	.4
Port Byron silt loam, 2 to 6 percent slopes	4,098	1.5
Quarry	351	.1
Raddle silt loam, 0 to 2 percent slopes	3,190	1.2
Raddle silt loam, 2 to 6 percent slopes	1,962	.7
Radford silt loam	4,070	1.5
Rozetta silt loam	5,012	1.8
Sable silty clay loam	1,502	.6
Saude loam	335	.1
Sawmill silty clay loam	11,248	4.1
Sawmill silty clay loam, wet	954	.4
Seaton silt loam, 2 to 6 percent slopes	687	.3
Seaton silt loam, sandy substratum, 2 to 6 percent slopes	770	.3
Seaton silt loam, 4 to 7 percent slopes, eroded	1,815	.7
Seaton silt loam, 7 to 12 percent slopes, eroded	1,664	.6
Seaton silt loam, 12 to 18 percent slopes, eroded	951	.4
Seaton-Oakville complex, 7 to 12 percent slopes, eroded	367	.1
Seaton-Oakville complex, 12 to 18 percent slopes, eroded	522	.2
Seaton-Oakville complex, 18 to 30 percent slopes, eroded	529	.2
Seaton-Timula silt loams, 7 to 12 percent slopes, eroded	599	.2
Seaton-Timula silt loams, 12 to 18 percent slopes, eroded	1,917	.7
Seaton-Timula silt loams, 18 to 30 percent slopes, eroded	1,530	.6
Sparta sand, 0 to 6 percent slopes	7,487	2.8
Strawn-Chute complex, 25 to 60 percent slopes	873	.3
Stronghurst silt loam	2,677	1.0
Sylvan silt loam, 12 to 18 percent slopes	1,467	.5
Sylvan silt loam, 18 to 30 percent slopes	4,190	1.5
Sylvan soils, 7 to 12 percent slopes, severely eroded	2,473	.9
Sylvan soils, 12 to 18 percent slopes, severely eroded	7,783	2.9
Sylvan soils, 18 to 30 percent slopes, severely eroded	1,414	.5
Sylvan-Bold silt loams, 18 to 60 percent slopes	1,380	.5
Tama silt loam, 0 to 2 percent slopes	1,200	.4
Tama silt loam, 2 to 6 percent slopes	7,035	2.6
Tama silt loam, 4 to 7 percent slopes, eroded	2,893	1.1
Tama silt loam, 7 to 12 percent slopes, eroded	2,053	.8
Trempealeau silt loam, 0 to 4 percent slopes	340	.1
Velma silt loam, 12 to 18 percent slopes	652	.2
Velma-Coatsburg silt loams, 12 to 18 percent slopes, eroded	359	.1
Wabash silty clay	932	.3
Waukee loam, 0 to 4 percent slopes	1,571	.6
Water	15,517	5.5
Total	271,488	100.0

[1] Less than 0.1 percent.

north and 35 feet east of southwest corner of section; SW¼SW¼SW¼ sec. 33, T. 16 N., R. 2 W.

Ap—0 to 5 inches, dark-brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) and brown (10YR 5/3) dry; moderate, very fine, granular structure; friable; neutral; clear, smooth boundary.

B21t—5 to 10 inches, dark-brown and brown (10YR 4/3) light silty clay loam, dark grayish brown (10YR 4/2) crushed; few, fine, distinct, yellowish-brown (10YR 5/8) mottles and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; thin, continuous, dark grayish-brown (10YR 4/2) clay films; moderate, fine, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

IIB22tg—10 to 20 inches, dark grayish-brown (2.5Y 4/2) silty clay loam, very dark grayish brown (10YR 3/2) crushed; few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; thin, continuous, very dark gray (10YR 3/1) clay films; moderate, fine, angular blocky structure parting to moderate, fine, granular; firm; medium acid, gradual, smooth boundary.

IIB23tg—20 to 25 inches, gray (10YR 5/1) heavy clay loam, dark grayish brown (10YR 4/2) crushed; few, very fine, distinct, dark yellowish-brown (10YR 4/4) mottles; thin, continuous, very dark gray (10YR 3/1) clay films; moderate, fine, granular structure; firm; many sand grains; medium acid; clear, smooth boundary.

IIB24tg—25 to 35 inches, grayish-brown (2.5Y 5/2) clay loam, grayish brown (2.5Y 5/2) crushed; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; thin, continuous, dark-gray (10YR 4/1) clay films; moderate, fine, angular blocky structure; firm; many sand grains and some small gravel; strongly acid; gradual, smooth boundary.

IIB25tg—35 to 46 inches, gray (2.5Y 5/1) clay loam, grayish brown (2.5Y 5/2) crushed; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; patchy, dark-gray (10YR 4/1) clay films on peds; moderate, fine, angular blocky structure; firm; some strong-brown (7.5YR 5/6) iron-manganese concretions; sand and many small stones; strongly acid; clear, smooth boundary.

IIB3tg—46 to 69 inches, light brownish-gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) crushed; common, medium, distinct, yellowish-brown (10YR 5/4) and light olive-brown (2.5Y 5/6) mottles; patchy, dark-gray (10YR 4/1) clay films on peds; weak, angular blocky structure; firm; some strong-brown (7.5YR 5/6) iron concretions; sand and many small stones; medium acid; gradual, smooth boundary.

IIC—69 to 85 inches, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/6) clay loam, light olive brown (2.5Y 5/6) crushed; few, fine, prominent, yellowish-red (5YR 5/8) mottles; massive; abundant, black (5YR 2/1) iron-manganese concretions; sand and many small stones; medium acid.

The solum ranges from 48 to 72 inches in thickness. A loess cap as much as 20 inches thick is in some places. In undisturbed areas the A horizon ranges from silt loam to loam and is 5 to 10 inches thick. Most areas are disturbed and the A1 horizon and A2 horizon are mixed or destroyed. The Ap horizon is silt loam, silty clay loam, loam, or clay loam. The part of the B horizon that formed in loess is 5 to 15 inches thick and is silty clay loam. The underlying buried soil ranges from clay loam to light clay and is 40 to 60 inches thick.

Atlas soils are on uplands, as are Hickory and High Gap soils. They are more poorly drained and have more clay in the B horizon than Hickory soils. They are more poorly drained and do not have the underlying shale that is typical of High Gap soils.

Atterberry Series

The Atterberry series consists of somewhat poorly drained, nearly level soils that are mainly on uplands. These soils formed in deep loess under grass and timber vegetation.

In a representative profile the surface layer is black and dark-brown silt loam about 8 inches thick. The subsurface layer is dark-brown to brown silt loam about 5 inches thick. The subsoil is silty clay loam about 33 inches thick. The upper part of it is brown and grayish brown mottled with yellowish brown, and the lower part is light olive brown mottled with yellowish brown. The underlying material is light olive-brown to light olive-gray silt loam mottled with yellowish brown.

Atterberry soils are moderately to moderately slowly permeable and have very high available water capacity. They are suited to all crops commonly grown in the county.

Representative profile of Atterberry silt loam, 565 feet east of center of south 320 acres of section and 20 feet south in the northeast corner of the NW¼SW¼-SE¼ sec. 1, T. 16 N., R. 2 W.

Ap—0 to 8 inches, black (10YR 2/1) and dark-brown (10YR 4/3) silt loam; moderate, very fine and fine, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

A2—8 to 13 inches, brown to dark-brown (10YR 4/3) silt loam; dark grayish-brown (10YR 4/2) organic coatings and white (10YR 8/1) uncoated silt grains on peds; weak, medium, platy structure parting to moderate, very fine, subangular blocky; friable; very dark gray (10YR 3/1) worm casts; few iron concretions; numerous fine pores; neutral; clear, smooth boundary.

B21t—13 to 21 inches, brown (10YR 5/3) silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; thin, continuous, grayish-brown (10YR 5/2) clay films on peds; thin, patchy, dark grayish-brown (10YR 4/2) organic coatings on peds; moderate, fine, subangular blocky structure; friable; numerous fine pores; many fine iron-manganese concretions; few, white (10YR 8/1), uncoated silt grains; strongly acid; clear, smooth boundary.

B22t—21 to 28 inches, grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/4) silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles and few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; thin, continuous, grayish-brown (2.5Y 5/2) clay films on peds; moderate, medium, prismatic structure parting to moderate, medium, angular blocky; firm; few, white (10YR 8/1), uncoated silt grains; many fine iron-manganese concretions; many fine pores; strongly acid; gradual, smooth boundary.

B23tg—28 to 39 inches, light olive-brown (2.5Y 5/4) and light olive-gray (5Y 6/2) silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; continuous, grayish-brown (2.5Y 5/2) and dark grayish-brown (10YR 4/2) clay films on vertical surfaces of peds; moderate, medium, prismatic structure; firm; many fine pores; many iron-manganese concretions; few, white (10YR 8/1), uncoated silt grains; very dark grayish-brown (10YR 3/2) worm casts; medium acid; clear, smooth boundary.

B3tg—39 to 46 inches, light olive-brown (2.5Y 5/4) and light olive-gray (5Y 6/2) silty clay loam, light olive brown (2.5Y 5/4) crushed; many, medium, prominent, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; discontinuous, grayish-brown (2.5Y 5/2) and dark grayish-brown (10YR 4/2) clay films on vertical surfaces of peds; moderate, coarse, prismatic structure; firm; many fine pores; many iron concretions; very dark grayish-brown (10YR

3/2) organic coatings in root channels; neutral; gradual, smooth boundary.

Cg—46 to 54 inches, light olive-brown (2.5Y 5/4) to light olive-gray (5Y 6/2) heavy silt loam; many, medium, prominent, yellowish-brown (10YR 5/6 and 10YR 5/8) mottles; massive; many iron concretions; many fine pores; very dark grayish-brown (10YR 3/2) organic coatings in root channels; moderately alkaline; slightly effervescent.

The solum ranges from 40 to 60 inches in thickness. The silt loam A1 or Ap horizon is 6 to 10 inches thick. The silt loam A2 horizon is 5 to 8 inches thick and ranges from dark grayish brown or grayish brown to brown. The silty clay loam B horizon ranges from 30 to 45 inches in thickness. The silt loam C horizon ranges from slightly acid to moderately alkaline.

Atterberry soils are in a soil pattern with Downs and Muscatine soils. They are more poorly drained than Downs soils. They have a thinner, dark-colored A horizon than Muscatine soils.

Atterberry silt loam (61).—In most places this nearly level soil is on ridgetops. Areas are irregularly shaped and are mainly away from the drainageways toward the center of the ridgetop. Most are less than 10 acres in size, but a few are more than 100 acres.

Included with this soil in mapping are a few areas of less productive, poorly drained Denny soils and areas of soils that are similar to Atterberry soils, but are poorly drained and remain wet for longer periods after rains than Atterberry soils. Almost all of these areas are indicated by a wet spot symbol on the soil map. Also included are a few areas at heads of drainageways where slopes are 3 to 4 percent and the soil is eroded in most places and needs to be stabilized.

Occasionally the water table is high. The organic-matter content is moderate.

This soil is used mainly for cultivated crops, but is suited to all crops commonly grown in the county. Capability unit I-2; woodland suitability group 3o1; wildlife group 4; recreation group 5.

road and about 1,650 feet south of Illinois Highway 92 in the southwest corner of NE¼SW¼NE¼ sec. 8, T. 16 N., R. 5 W.

Ap—0 to 4 inches, very dark grayish-brown (10YR 3/2) and some brown (10YR 4/3) fine sand; single grained; loose; neutral; clear, smooth boundary.

A21—4 to 8 inches, brown (10YR 4/3) and very dark grayish-brown (10YR 3/2) fine sand; single grained; loose; medium acid; clear, smooth boundary.

A22—8 to 36 inches, yellowish-brown (10YR 5/6) fine sand; single grained; loose; neutral; clear, smooth boundary.

A&B—36 to 45 inches, yellowish-brown (10YR 5/6) fine sand (A2); single grained; loose; lamellae of dark-brown (7.5YR 4/4) loamy fine sand (B2t); weak, coarse, subangular blocky structure; very friable; volume of A material and B material is about equal, lamellae are less than 1 inch thick; neutral; clear, smooth boundary.

B&A—45 to 64 inches, brown (7.5YR 5/4) loamy fine sand (B2t), and strong-brown (7.5YR 5/6) fine sand (A2); weak, coarse, subangular blocky structure; very friable; neutral; clear, smooth boundary.

C—64 to 80 inches, brown (7.5YR 5/4) and strong-brown (7.5YR 5/6) fine sand; single grained tending toward coarse, subangular blocky structure; very friable; neutral.

The solum ranges from 60 to 72 inches in thickness. The A horizon in undisturbed areas is mainly fine sand or loamy fine sand and ranges from 35 to 45 inches in thickness. In some undisturbed areas the A1 horizon is less than 6 inches thick and ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2). The A&B horizon is 25 to 35 inches thick. The sandier part of it ranges from fine sand to loamy fine sand. The lamellae range from fine sand to loamy fine sand and commonly are ½ inch to about 2 inches thick. They become thicker with increasing depth, and in some places, tend to merge into a composite layer. The C horizon ranges from fine sand to loamy fine sand and from slightly acid to neutral.

Bloomfield soils are associated with Lamont and Tell soils. They are sandier throughout the profile than Lamont or Tell soils. They are typified by alluvial bands, a characteristic not common to Lamont or Tell soils. Bloomfield soils do not have the silty A horizon and B horizon that are

ity unit IVs-1; woodland suitability group 4s2; wildlife group 7; recreation group 2.

Bold Series

The Bold series consists of steep to very steep, well-drained soils on uplands. These soils formed in deep loess under native timber vegetation.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. It is moderately alkaline. The underlying material is yellowish-brown heavy silt and also is moderately alkaline.

Bold soils are moderately permeable and have high available water capacity. The high content of natural lime decreases the amount of available phosphate and potash. The soils are better suited to grasses and legumes or trees than to other crops. Most slopes are too steep to be suited to cultivated crops.

Bold soils in this county are mapped only in a complex with Sylvan soils.

Representative profile of Bold silt loam in an area of Sylvan-Bold silt loams, 18 to 60 percent slopes, on a prominently exposed bluff above northwest side of road in the southwest corner of SW¼NE¼NW¼ sec. 20, T. 18 N., R. 1 E.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt

Burkhardt Series

The Burkhardt series consists of nearly level to gently sloping, somewhat excessively drained soils on terraces. These soils formed in sandy deposits and are underlain by sand and gravel. The native vegetation was prairie grasses.

In a representative profile the surface layer is very dark gray and very dark grayish-brown sandy loam about 13 inches thick. The subsoil is about 11 inches thick. It is mainly dark brown but some is brown and dark yellowish brown. The upper part of it is sandy loam, and the lower part is gravelly loamy sand. The underlying material is mainly yellowish-brown and dark-brown medium and coarse sand and fine gravel.

Burkhardt soils are droughty. They are moderately rapidly to rapidly permeable and have low available water capacity. They are better suited to drought-resistant crops than to most others.

Representative profile of Burkhardt sandy loam in an area of Burkhardt-Saude complex, 0 to 4 percent slopes, 58 feet southwest of right-of-way marker on southeast side of Illinois Highway 84 in the northeast corner of SE¼SE¼SE¼ sec. 33, T. 21 N., R. 2 E.

A1—0 to 7 inches, very dark gray (10YR 3/1) and very dark grayish-brown (10YR 3/2) sandy loam; moderate fine and medium granular structure;

the profile described as representative of the Burkhardt and Saude series.

Included with these soils in mapping on the eastern part of Arsenal Island are soils similar to Burkhardt and Saude soils, but limestone bedrock is at a depth of about 3 feet and limits the use of this area.

Soil blowing is a hazard, and Burkhardt soils are more susceptible to soil blowing than Saude soils, because the surface layer of Burkhardt soils has more sand. Droughtiness is a hazard. The organic-matter content is moderate.

Most of the acreage is used for crops commonly grown in the county, but it is suited to specialty crops if irrigated. Capability unit IIIs-1; woodland suitability group 3s2; wildlife group 7; recreation group 2.

Calco Series

The Calco series consists of nearly level, poorly drained soils on bottom lands. These soils formed in calcareous alluvium.

In a representative profile the surface layer is about 29 inches thick. It is black and very dark gray silty clay loam that has many snail shell fragments. The subsoil is very dark gray silty clay loam, has many snail shell fragments, and is about 15 inches thick. The underlying material is stratified. The upper 10 inches of it is greenish-gray silty clay loam that has a few snail shell fragments; moderately alkaline; violently effervescent.

The solum ranges from 40 to 60 inches in thickness. It is slightly effervescent to very strongly effervescent. The A horizon is black to very dark gray and ranges from 24 to 36 inches in thickness. The gleyed silty clay loam B horizon ranges from 15 to 25 inches in thickness. The gleyed C horizon ranges from silty clay loam to silt loam and clay loam. It ranges from slightly effervescent to violently effervescent. The soil has snail shell fragments throughout in most places.

Calco soils are on bottom lands, as are Sawmill, Otter, and Millington soils. They have more natural lime than Sawmill and Otter soils. They have more clay and less sand than Millington soils.

Calco silty clay loam (400).—This nearly level soil is dominantly in areas adjacent and parallel to rivers or creeks. In most places it is at one of the lowest positions on the landscape. Most areas are somewhat long and narrow. Most are less than 10 acres in size, but a few are more than 30 acres. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of Sawmill silty clay loam, Otter silt loam, and Millington silt loam. Sawmill and Otter soils are less alkaline than Calco soils and fertilizer requirements differ. Millington and Otter soils have less clay in the surface layer than Calco soils and are more easily worked.

Frequently the water table is high in this soil. Flood-

Canisteo Series

The Canisteo series consists of nearly level, poorly drained soils on terraces. These soils formed in glacial drift.

In a representative profile the surface layer is about 18 inches thick. It is mainly black silt loam and has common shell fragments. The subsoil is dark-gray and grayish-brown silt loam. It has common shell fragments and is about 18 inches thick. The underlying material is gray stratified loam and silt loam.

Canisteo soils are moderately permeable and have high available water capacity. The high content of lime is caused by shells. The soils are better suited to crops than Canisteo soils, and fertilizer requirements differ. Some less productive sandy areas that are about 1 acre in size are indicated on the soil map by a spot symbol. Also included are a few areas of very poorly drained soils that are about 1 acre in size and are indicated on the soil map by the symbol for wet spots.

Frequently the water table is high in this soil. The organic-matter content is moderate. The high content of lime decreases the amount of available phosphorus.

This soil is used mainly for cultivated crops. It is better suited to crops tolerant of the seasonally high water table and the high lime content than to most others. Capability unit IIw-1; woodland suitability

Clayey Terrace Escarpments

Clayey terrace escarpments (577) occur as strongly sloping to steep, somewhat long and narrow breaks. Slopes are short and separate less sloping soils at different levels on terraces. Slopes range from 7 to 30 percent. Most areas of these escarpments are mod-

fine to medium, granular structure; friable; medium acid; clear, smooth boundary.

B1—12 to 18 inches, dark-gray (10YR 4/1), very dark gray (10YR 3/1), and grayish-brown (10YR 5/2) silty clay loam; moderate, fine and medium, granular structure; firm; many visible sand grains; medium acid; clear, smooth boundary.

IIB21tg—18 to 30 inches, grayish-brown (2.5Y 5/2) and some very dark gray (10YR 3/1) and dark-gray

Representative profile of Coffeen silt loam, 130 feet west and 1,315 feet north of the center of sec. 25, T. 16 N., R. 6 W.

Ap—0 to 5 inches, black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak, thick, platy structure parting to moderate, very fine and fine, granular; friable; few sand grains; medium acid; abrupt, smooth boundary.

A12—5 to 9 inches, black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak, thick, platy structure; friable; few sand grains; medium acid; abrupt, smooth boundary.

A13—9 to 13 inches, very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate, medium, subangular blocky structure, slight tendency to part to weak, medium, platy structure; friable; few sand grains; medium acid; clear, smooth boundary.

A3—13 to 19 inches, mixed very dark gray (10YR 3/1) and dark grayish-brown (10YR 4/2) silt loam and visible sand; weak, medium, prismatic structure parting to moderate, fine and medium, subangular blocky; friable; few very fine sand grains; medium acid; clear, smooth boundary.

B1—19 to 29 inches, dark grayish-brown (10YR 4/2) silt loam and sand grains; many, fine, faint, brown (10YR 5/3) and pale-brown (10YR 6/3) mottles and few, fine, faint, light-gray (10YR 7/1 and 10YR 7/2) mottles; weak, coarse, prismatic structure; friable; some very dark gray (10YR 3/1) and pale-brown (10YR 6/3) worm casts; few very fine sand grains; neutral; clear, smooth boundary.

B2—29 to 44 inches, light brownish-gray (10YR 6/2) silt loam; many, fine, distinct, dark-brown (10YR 4/3) mottles; weak, coarse, prismatic structure; friable; many root channels; neutral; abrupt, smooth boundary.

IIC1—44 to 49 inches, very pale brown (10YR 7/3) medium sand, white (10YR 8/2) dry, very pale brown (10YR 7/4) crushed; single grained; loose; few shells; neutral; abrupt, smooth boundary.

IIIC2—49 to 69 inches, mottled light-gray (10YR 6/1), pale-brown (10YR 6/3), white (10YR 8/2), and strong-brown (7.5YR 5/6) sandy clay loam; massive; black (5YR 2/1) root channel linings; common, medium iron-manganese stains ranging from dark yellowish brown (10YR 4/4) to dark reddish brown (5YR 2/2); slightly acid.

The A horizon ranges from 10 to 20 inches in thickness, from silt loam to loam, and from black to very dark gray. The B horizon is 20 to 30 inches thick and is silt loam or loam. The C horizon, in most places, is layers of silt loam stratified with silty clay loam, clay loam, loam, or sand. The [illegible] throughout.

Occasionally, the water table is high in this soil. Flooding is a hazard on unprotected bottom lands. The organic-matter content is moderate.

These soils are used mainly for cultivated crops and are suited to this use. The degree of suitability for any use in areas subject to overflow depends on the frequency and duration of flooding. Capability unit I-3; woodland suitability group 2o4; wildlife group 5; recreation group 6.

Coyne Series

The Coyne series consists of well-drained, nearly level to strongly sloping soils on terraces. These soils formed in sandy material and in the underlying reddish loamy deposits. The native vegetation was prairie grass.

In a representative profile the surface layer is mainly very dark gray fine sandy loam about 23 inches thick. The subsoil is about 32 inches thick. The upper 5 inches is mainly very dark grayish-brown and dark grayish-brown fine sandy loam, the next 14 inches is brown and dark-brown fine sandy loam, and the lower 13 inches is mainly reddish-brown silty clay loam and loam. The underlying material is brown and dark-brown sand and fine gravel.

Coyne soils are moderately rapidly to moderately permeable and have moderate available water capacity. They are somewhat droughty, and are better suited to drought-resistant crops than to most other uses.

Representative profile of Coyne fine sandy loam, 0 to 4 percent slopes, 244 feet east of north-south road fence and 473 feet north of east-west fence, in the northwest corner of SW¼NW¼SE¼ sec. 10, T. 20 N., R. 2 E.

Ap—0 to 9 inches, very dark gray (10YR 3/1) fine sandy loam; weak, coarse, subangular blocky structure parting to moderate, very fine and fine, granular; very friable; slightly acid; clear, smooth boundary.

A12—9 to 13 inches, black (10YR 2/1) fine sandy loam; weak, coarse, subangular blocky structure parting to moderate, very fine and fine, granular; very friable; slightly acid; clear, smooth boundary.

A13—13 to 23 inches, very dark gray (10YR 3/1) and some very dark grayish-brown (10YR 3/2) fine sandy loam; weak, coarse, subangular blocky structure parting to moderate, very fine and fine, granular; very friable; slightly acid; clear, smooth

IIIC—55 to 60 inches, brown and dark-brown (7.5YR 4/4) sand and fine gravel; single grained; medium acid.

The solum ranges from 48 to 72 inches in thickness. Depth from the surface to the reddish IIB horizon ranges from 40 to 60 inches. The A horizon ranges from fine sandy loam to loamy sand and is 10 to 24 inches thick. It ranges from very dark gray to dark brown and black. The upper part of the B horizon ranges from light sandy loam to light loam. The reddish IIB horizon is 6 to 18 inches thick. It is loam, silt loam, clay loam, or silty clay loam. The IIC horizon is commonly sand and fine gravel, but in some places it is stratified silt loam, silty clay loam, loam, or clay loam. It is medium acid to neutral.

Coyne soils are on terraces, as are Dickinson and Joslin soils. They have a reddish IIB horizon, and Dickinson soils do not. They have more sand in the A horizon and B horizon and less clay in the IIB horizon than Joslin soils.

Coyne fine sandy loam, 0 to 4 percent slopes (764A). —This soil is in areas that are in no apparent pattern and are irregularly shaped. Most are less than 20 acres in size, but a few are more than 40 acres. This soil has

for this deposit are the same as for the reddish underlying layer of Joslin soils.

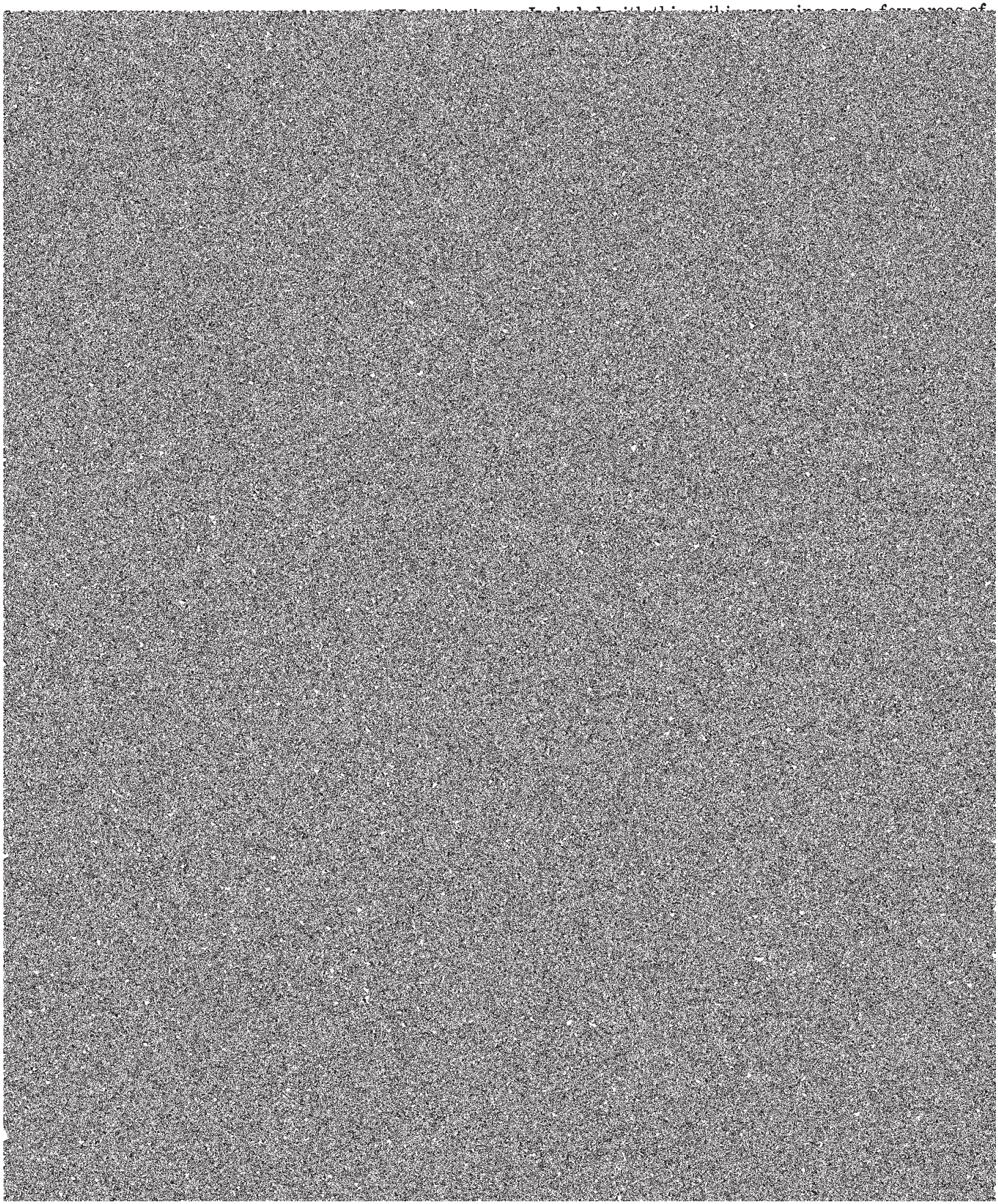
This Coyne soil is subject to water erosion and soil blowing if slopes are improperly managed. Droughtiness is a hazard. The organic-matter content is moderate.

This soil is used mainly for all cultivated crops commonly grown, but is suited to specialty crops if erosion is controlled and the supply of water is adequate. Capability unit IIIe–2; woodland suitability group 3s2; wildlife group 1; recreation group 3.

Cut and Fill Land

Cut and fill land (C.F.) occurs where soil material has been excavated and moved to another location. Size and shape are determined by the specific use of the area.

Cut and fill land ranges widely in texture. Underlying material is exposed at excavated sites and a mixture of



Dickinson soils are on terraces, as are Sparta and Hoopeston soils. They are less sandy throughout than Sparta soils. They are better drained than Hoopeston soils.

Dickinson sandy loam, 0 to 4 percent slopes (87A).—In most places this soil is in areas that are irregularly shaped and are in no apparent pattern. Most areas are less than 10 acres in size, but a few are more than 80 acres. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of somewhat droughtier, less productive Sparta soils; minor areas of less droughty, somewhat more productive soils that have more silty material in the subsoil; and soils similar to Dickinson sandy loam that have low to very low organic-matter content in the surface layer.

This soil is subject to soil blowing in unprotected areas. Droughtiness is a hazard. The organic-matter content is moderate.

This soil is used mainly for the cultivated crops commonly grown, but is suited to specialty crops if irrigated. Capability unit IIIs-1; woodland suitability group 3s2; wildlife group 7; recreation group 2.

tent of lime. The soils are better suited to crops tolerant of high lime content than to most other uses.

Representative profile of Dorchester silt loam, 466 feet generally north along centerline of curved road from north edge of drainage ditch and 39 feet east into field from center of road in the southeast corner of NE¼NW¼NE¼ sec. 14, T. 16 N., R. 6 W.

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; compacted parting to moderate, fine and medium, granular structure; friable; mildly alkaline; clear, smooth boundary.

C1—8 to 13 inches, brown to dark-brown (10YR 4/3) and very dark gray (10YR 3/1) fine sandy loam; compacted parting to moderate, fine, granular structure; very friable; many visible pale-brown (10YR 6/3) sand grains; moderately alkaline; slightly effervescent; clear, smooth boundary.

C2—13 to 26 inches, dark grayish-brown (10YR 4/2) and some very dark gray (10YR 3/1) fine sandy loam; few, fine, faint, brown to dark-brown (10YR 4/3 and 7.5YR 4/4) mottles; weak, medium, subangular blocky structure parting to moderate, fine, granular; very friable; moderately alkaline; strongly effervescent; clear, smooth boundary.

C3—26 to 37 inches, brown to dark-brown (10YR 4/3) and very dark gray (10YR 3/1) silt loam; weak, me-

This soil is used mainly for cultivated crops and pasture. It is better suited to crops tolerant of high natural lime content than to most other crops. Some areas have been converted to woodland. The degree of suitability for any use in areas subject to overflow depends on the frequency and duration of flooding. Capability unit I-3; woodland suitability group 2o4; wildlife group 5; recreation group 6.

Downs Series

The Downs series consists of well-drained, nearly level to moderately sloping soils on uplands. These soils formed in deep loess under mixed grass and timber.

B23t—28 to 33 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) mottles; light-gray to gray (10YR 6/1) uncoated silt grains that are discontinuous on faces of peds; moderate, medium, subangular blocky structure; friable; strongly acid; gradual, smooth boundary.

B24t—33 to 39 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4) and dark yellowish-brown (10YR 4/4) mottles; light-gray to gray (10YR 6/1) uncoated silt grains that are discontinuous on faces of peds; weak, medium to fine, prismatic structure parting to weak, medium, subangular blocky; friable; strongly acid; gradual, smooth boundary.

B25t—39 to 46 inches, mixed yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) silty clay

soil characteristics. A few areas of less productive, poorly drained soils are indicated on the soil map by a spot symbol.

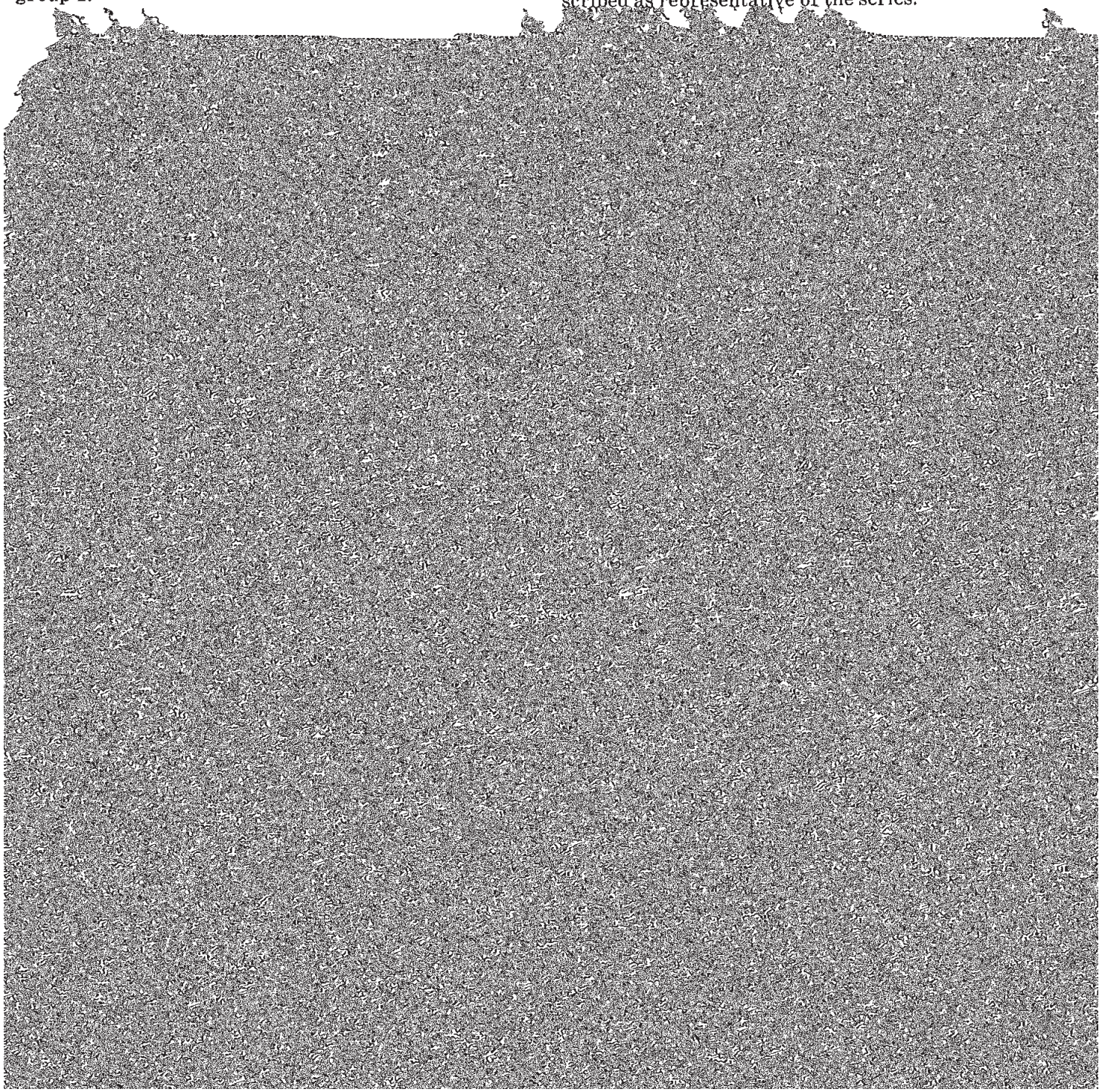
This soil is subject to erosion if slopes are improperly managed. The organic-matter content is moderate.

This soil is used mainly for cultivated crops but is well suited to all crops commonly grown in the county. In some places it is used for urban development, and it is well suited to this use. Capability unit IIe-1; woodland suitability group 2o1; wildlife group 1; recreation group 1.

The B3 horizon is light silty clay loam or silt loam. The silt loam C horizon is mildly alkaline or moderately alkaline.

Elkhart soils formed in thick loess, as did Tama and Sylvan soils. Their solum is thinner than that of Tama soils. They are dark colored to a greater depth than Sylvan soils.

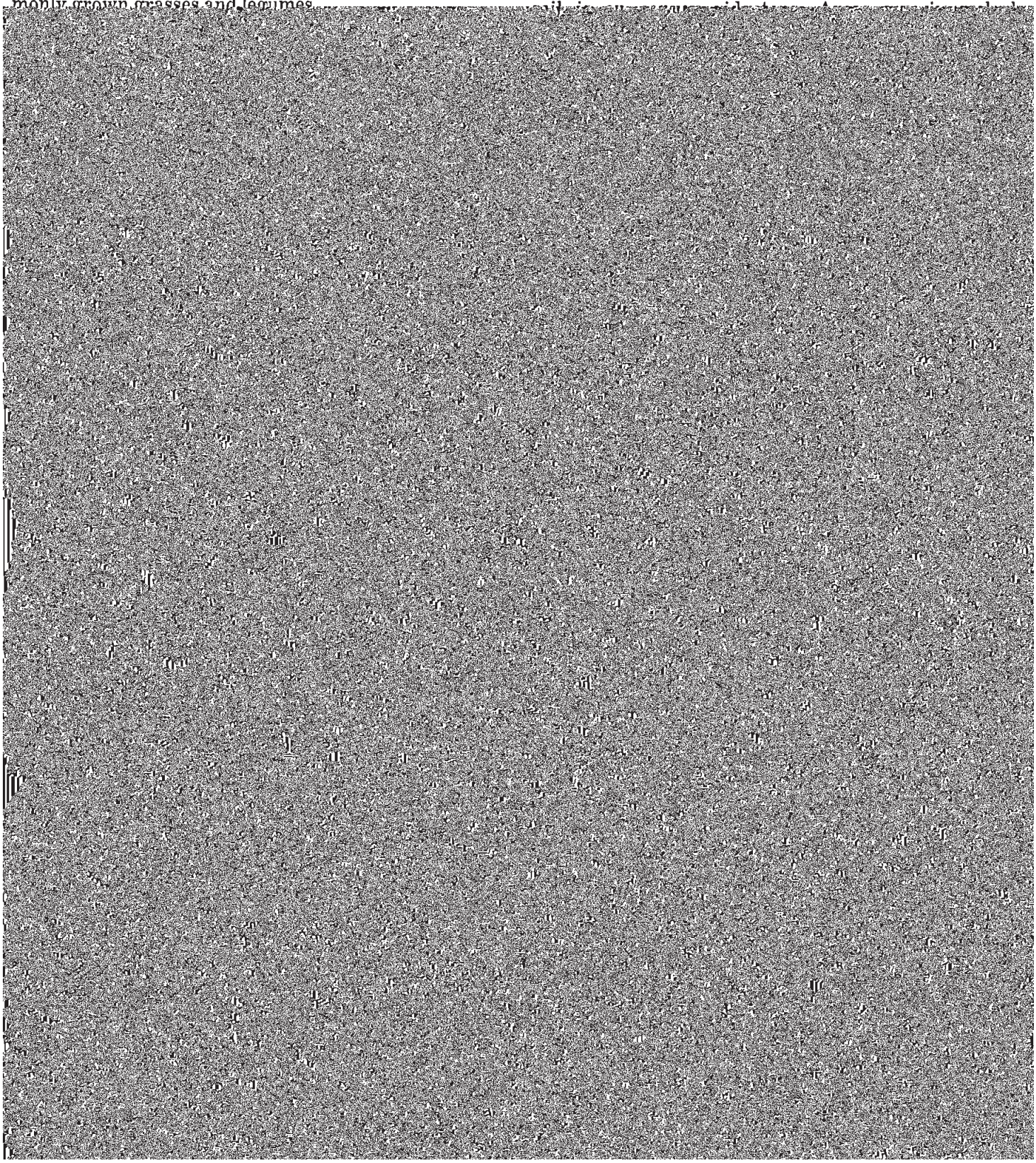
Elkhart silt loam, 7 to 12 percent slopes, eroded (567D2).—In most places this soil is on sides or at upper ends of valleys below less sloping ridgetops. Areas are mainly less than 5 acres in size, but a few are more than 35 acres. This soil has the profile described as representative of the series.



Fayette soils are moderately permeable and have high to very high available water capacity. They are suited to the cultivated crops commonly grown if erosion is controlled. They are also well suited to commonly grown grasses and legumes.

Fayette soils are in a soil pattern with Sylvan and Rozetta soils. They have a thicker solum than Sylvan soils. They are better drained than Rozetta soils.

Fayette silt loam, 2 to 6 percent slopes (280B).—This



matter content. Some areas of Fayette soils where the surface layer is uneroded and tilth is good are included. A few very poorly drained soils are indicated on the soil map by the symbol for wet spots. Also included are a few soils in which the surface layer and subsoil are less than 40 inches thick. The shortage of good compaction material in these soils should be considered before they are used for embankments.

This soil is subject to severe erosion if slopes are improperly managed. The organic-matter content is low.

This soil is used mainly for cultivated crops. If properly managed, it is suited to all crops commonly grown in the county. Capability unit IIIe–1; woodland suitability group 2o1; wildlife group 1; recreation group 3.

Fayette soils, 7 to 12 percent slopes, severely eroded (280D3).—In most places these soils are on short sides or at upper ends of valleys below less sloping ridgetops. In a few places they are on the upper part of slopes, above loamy or shaly soils. Most areas are less than 5 acres in size, but a few are more than 15 acres. A profile of these soils is similar to the one described as representative of the series, but the surface layer is mainly the brownish silty clay loam subsoil.

Included with these soils in mapping are a few areas of soils similar to Fayette soils where the surface layer and subsoil are less than 40 inches thick. The shortage of good compaction material in these soils should be considered before they are used for embankments. Also included are sandy spots that are less than 1 acre in size and are indicated on the soil map by a spot symbol.

These soils are subject to further erosion if slopes are improperly managed. Runoff is rapid, and infiltration is slow. Most of the original surface layer is missing, tilth is poor, and organic-matter content is very low.

These soils are used or have been used mainly for cultivated crops and pasture. The severe hazard of erosion, however, limits suitability mainly to grasses and legumes or trees. Capability unit IVe–1; woodland suitability group 2o1; wildlife group 1; recreation group 3.

Gravelly Terrace Escarpments

Gravelly terrace escarpments (G577) occur as strongly sloping to steep, somewhat long and narrow breaks. Slopes are short and separate less sloping soils

Gravel Pit

Gravel pit (G.P.) occurs where gravel has been mechanically removed. Many areas are rectangular or square in shape, but some are confined within irregular property lines. Some areas are small, but a few are more than 100 acres in size.

In most areas the gravel is excavated to a depth of many feet, and gravel and sand are exposed in most of the remaining area.

Fertility and organic-matter content are low. If areas are reclaimed and vegetated, topdressing and fertilization are required. Some areas also need irrigation, and others need leveling.

Some areas are covered with water. Spoil material removed in excavation is adjacent to most areas. This material is part of the gravel pit, or in places is fill material. Some gravel pits are idle or are used for trash collection. Gravel pit is not assigned to a capability unit or a woodland, wildlife, or recreation group.

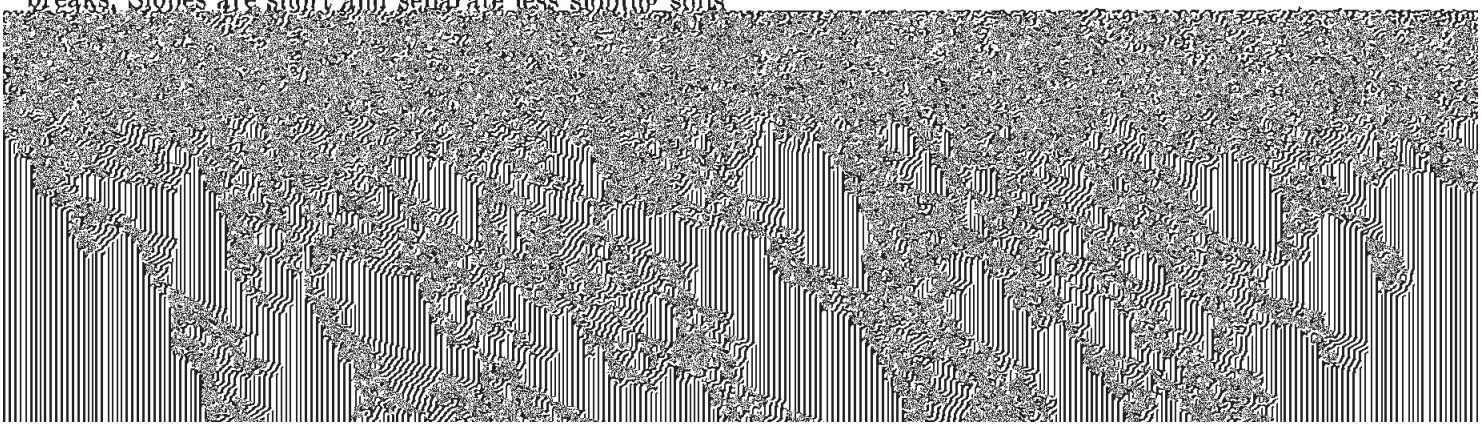
Hickory Series

The Hickory series consists of moderately steep to very steep, moderately well drained and well drained soils on uplands. These soils formed mainly in loamy glacial till under native hardwoods.

In a representative profile the surface layer is grayish-brown silt loam about 3 inches thick. The subsurface layer is light yellowish-brown and brownish-yellow silt loam about 7 inches thick. The subsoil is about 38 inches thick. The upper 7 inches of it is yellowish-brown silt loam and brownish-yellow silty clay loam. The next 10 inches is strong-brown silty clay loam and reddish-yellow clay. The lower 21 inches is brownish-yellow and olive-yellow clay loam. The underlying material is yellowish silt loam and sand.

Hickory soils are moderately permeable and have high to moderate available water capacity. They are better suited to grasses, legumes, or trees than to other crops. Most slopes are too steep for row crops.

Representative profile of Hickory silt loam, 18 to 30 percent slopes, 138 feet north parallel to Illinois Route 92 and at crest of roadbank, from center of gate to Boy Scouts of America property in the southeast corner of SE¼NE¼SW¼ sec. 35, T. 17 N., R. 4 W.



B21t—12 to 17 inches, brownish-yellow (10YR 6/6) light silty clay loam; moderately thick, discontinuous, brown (7.5YR 4/4) clay films on faces of peds; discontinuous, light-gray (10YR 7/1) dry, uncoated silt grains on faces of peds; strong, fine and medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundary.

IIB22t—17 to 23 inches, strong-brown (7.5YR 5/6) heavy silty clay loam and visible sand grains; patchy, light-gray (10YR 7/1) dry, uncoated silt grains on faces of peds; moderately thick, discontinuous, brown (7.5YR 4/4) clay films on faces of peds; strong, fine and medium, subangular blocky and angular blocky structure; firm; very strongly acid; clear, smooth boundary.

IIB23t—23 to 27 inches, reddish-yellow (7.5YR 6/6) light

representative of the series, but the surface layer is thinner and some of the subsoil material is mixed with it.

Included with this soil in mapping are soils similar to Hickory soils that are alkaline at a depth below about 30 inches. The high content of natural lime in the root zone decreases the amount of available phosphate and potash. Included are a few areas of Hickory soils where the surface is uneroded and tilth is good. Also included are severely eroded, less productive areas that are indicated on the soil map by a spot symbol.

This soil is subject to severe erosion if slopes are improperly managed. The organic-matter content is low,

tion is slow. Most of the original surface layer has been eroded away and, as a result, tilth is poor and organic-matter content is very low.

These soils are used or have been used mainly for cultivated crops and pasture. The severe hazard of erosion and moderately steep slopes, however, limit their suitability to grasses and legumes or trees. Capability unit VIe–1; woodland suitability group 1r2; wildlife group 2; recreation group 4.

Hickory soils, 18 to 30 percent slopes, severely eroded (8F3).—In most places these soils are on sides of valleys, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. In places they are at the heads of drainageways. Most areas are less than 10 acres in size, but a few are more than 40 acres. A profile of these soils is similar to the one described as representative of the series, but the surface layer is mainly the yellowish clay loam subsoil.

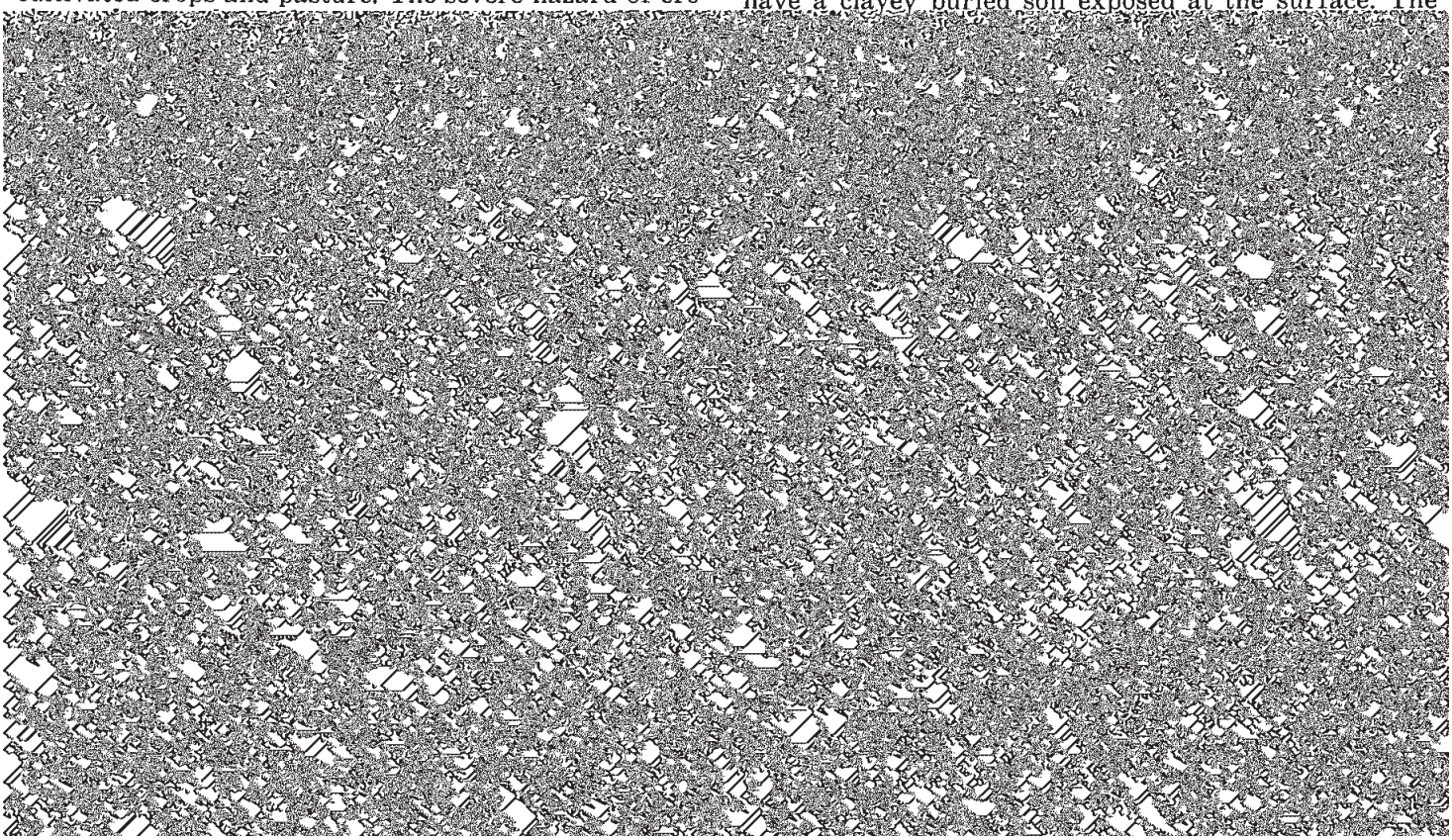
Included with these soils in mapping are soils similar to Hickory soils that are alkaline at a depth below about 24 inches. The high content of natural lime in the root zone decreases the amount of available phosphate and potash. Also included are some very steep areas where slopes are narrow. Most of these areas are less than 5 acres in size and are indicated on the soil map by the symbol for escarpment.

These Hickory soils are subject to further erosion if slopes are improperly managed. Runoff is rapid, and infiltration is slow. Most of the original surface layer has been eroded away and, as a result, tilth is poor and organic-matter content is very low.

These soils are used or have been used mainly for cultivated crops and pasture. The severe hazard of erosion and moderately steep slopes, however, limit suitability to grasses and legumes or trees. Capability unit VIIe–2; woodland suitability group 3r2; wildlife group 2; recreation group 4.

Hickory-Atlas complex, 18 to 30 percent slopes, severely eroded (946F3).—In most places this mapping unit is on sides of valleys, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. In places it is at the heads of drainageways. It is about 60 percent Hickory soils, and about 40 percent Atlas soils. Hickory soils commonly occupy the lower to middle parts of the slope, and Atlas soils occupy the more eroded middle to upper parts. Most areas are less than 10 acres in size, but a few are more than 25 acres. The profiles of these soils are similar to the ones described as representative of the Hickory and Atlas series, but the surface layer of the Hickory soil is mainly the yellowish clay loam subsoil.

Included with these soils in mapping are soils that have a clayey buried soil exposed at the surface. The



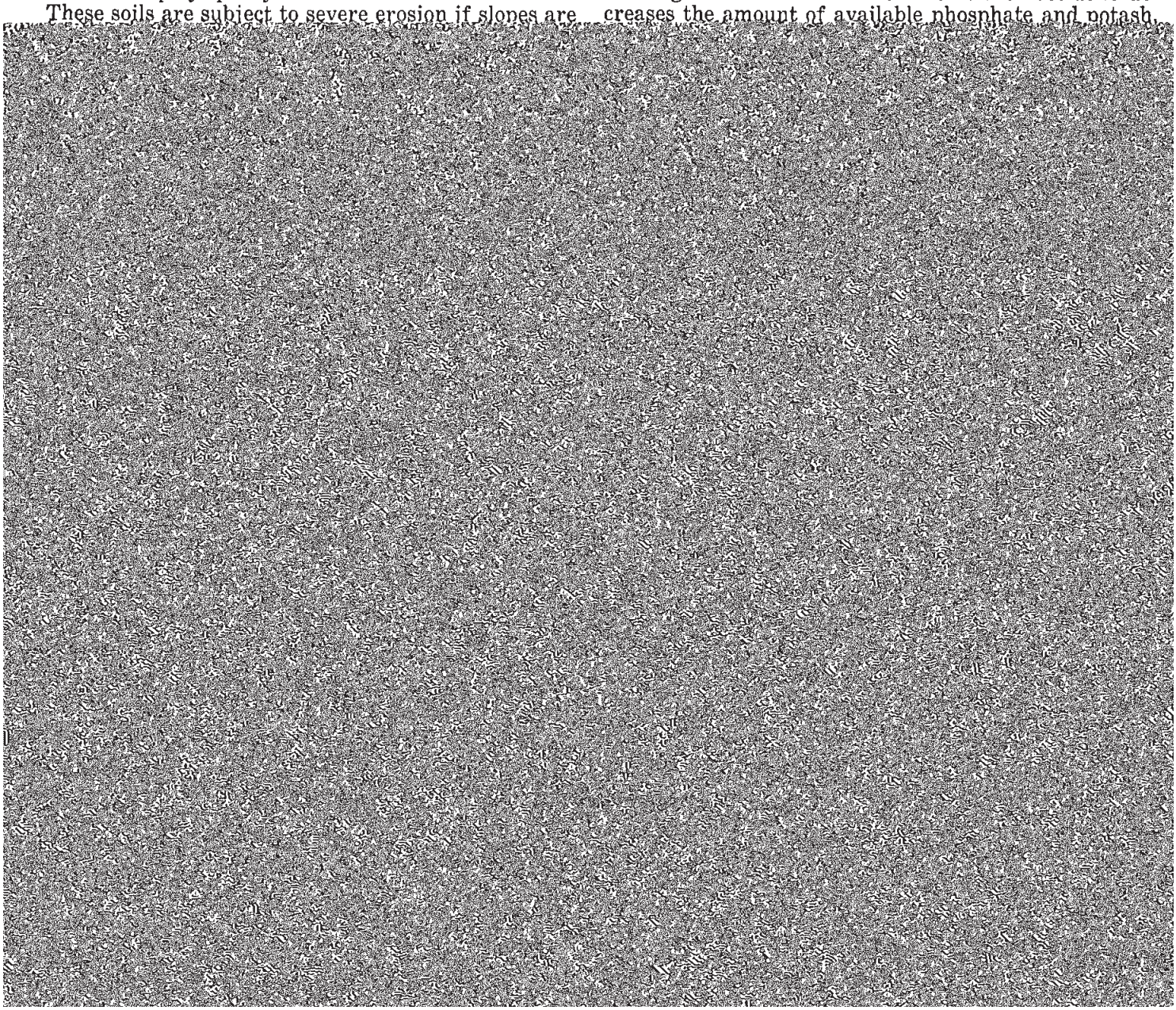
the upper parts of the slope, and High Gap soils occupy the lower part. Most areas are less than 15 acres in size, but a few are more than 80 acres. The profiles of these soils are similar to the ones described as representative of the Hickory and High Gap series, but the surface layer is thinner and some of the subsoil material is mixed with it.

Included with these soils in mapping are less productive soils that have clay shale within 20 inches of the surface and a few areas of Hickory and High Gap soils where the surface layer is uneroded and tilth is good. Included are soils similar to Hickory soils that are alkaline at a depth below about 30 inches. The high content of natural lime in the root zone decreases the amount of available phosphate and potash. Also included are outcrops of shale or sandstone and severely eroded areas. These less productive areas are indicated on the soil map by spot symbols.

These soils are subject to severe erosion if slopes are

(945G).—In most places this mapping unit is on sides of valleys, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. In places it is at the heads of drainageways. It is about 50 percent Hickory soil and about 50 percent High Gap soils. Hickory soils commonly occupy the upper part of the slope, and High Gap soils occupy the lower part. Most areas are less than 100 acres in size, but a few are more than 400 acres. These soils have profiles similar to the ones described as representative of the Hickory and High Gap series, but the subsoil is thinner.

Included with these soils in mapping are less productive soils that have clay shale within 20 inches of the surface and a few areas of eroded Hickory and High Gap soils where part of the surface layer is missing and tilth is poorer. Included are soils similar to Hickory soils that are alkaline at a depth below about 24 inches. The high content of natural lime in the root zone decreases the amount of available phosphate and potash.



These soils are or have been used mainly for cultivated crops and pasture. The severe hazard of erosion and moderately steep slopes, however, limit their suitability mostly to grasses and legumes or trees. Capability unit IVe–1; woodland suitability group 1r2; wildlife group 2; recreation group 4.

Hickory-Sylvan-Fayette complex, 12 to 18 percent

Included with these soils in mapping are soils similar to Hickory soils that are alkaline at a depth below about 30 inches. The high content of natural lime in the root zone decreases the amount of available phosphate and potash. Included are a few areas of eroded soils where part of the surface layer is missing and tilth is poorer and small areas of Atlas silt loam and High Gap silt

sides, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. In places it is at the heads of drainageways. It is about 50 percent Hickory silt loam and about 50 percent Sylvan silt loam.

Scouts of America property in the southeast corner of the SE¼NE¼SW¼ sec. 35, T. 17 N., R. 4 W.

A1—0 to 4 inches, grayish-brown (10YR 5/2) and brown (10YR 5/3) silt loam; grayish brown (10YR 5/2)

lying material weathered from limestone bedrock. The native vegetation was prairie grasses.

In a representative profile the surface layer is heavy loam about 14 inches thick. The upper 8 inches is very dark brown, and the lower 6 inches is very dark grayish brown and dark brown. The subsoil is mainly reddish brown and is about 16 inches thick. The upper 6 inches of it is clay loam, and the lower 10 inches is mainly sandy loam and some gravel. Limestone bedrock is at a depth of 30 inches.

These Hitt shallow variant soils are moderately permeable and have moderate available water capacity. Because the depth to bedrock is moderate, they are somewhat droughty. They are suited to all crops commonly grown in the county, but they are better suited to drought-resistant crops than to others.

Representative profile of Hitt loam, shallow variant, 0 to 4 percent slopes, 1,400 feet north and 295 feet west of the center of sec. 29, T. 19 N., R. 3 E.

Ap—0 to 8 inches, very dark brown (10YR 2/2) heavy loam; compact in place, parting to moderate, very fine and fine, granular structure; friable; some fine and medium gravel; mildly alkaline; abrupt, smooth boundary.

A3—8 to 14 inches, very dark grayish-brown (10YR 3/2) and dark-brown (7.5YR 3/2) heavy loam; moderate fine and medium granular structure; friable;

Included with this soil in mapping are areas of unproductive limestone bedrock that are indicated on the soil map by the symbol for rock outcrops.

This soil is droughty in most years. Roots penetrate mainly into the soil above the bedrock. The organic-matter content is moderate.

This soil is used mainly for the cultivated crops commonly grown, but if irrigated, it is suited to specialty crops. Capability unit IIs–1; woodland suitability group 3o1; wildlife group 1; recreation group 1.

Hoopeston Series

The Hoopeston series consists of nearly level, somewhat poorly drained soils on terraces. These soils formed in sandy deposits under native prairie grasses.

In a representative profile the surface layer is mainly very dark grayish-brown sandy loam about 15 inches thick. The subsoil is about 13 inches thick. The upper part of it is grayish-brown sandy loam mottled with brown, and the lower part is grayish-brown loamy sand mottled with brown. The underlying material is mainly brownish and grayish stratified sand, sandy loam, and loamy sand mottled with brown and strong brown.

Hoopeston soils are droughty. They are moderately rapidly permeable and have low available water capac-

and the B3 horizon is sandy loam or loamy sand. The C horizon ranges from sand to sandy loam. It is medium acid to neutral.

Hoopeston soils are on terraces, as are Dickinson and Lawler soils. They are more poorly drained than Dickinson soils. They have more sand throughout the solum than Lawler soils.

Hoopeston sandy loam (172).—In most places this nearly level soil is in lower positions between other soils on terraces. Areas are irregularly shaped, and most are less than 10 acres in size.

Included with this soil in mapping are small areas of Lawler soils that have more clay in the subsoil, are somewhat more productive, and are less droughty than Hoopeston soils. Also included are minor areas that are sandier and more poorly drained, remain wet longer, and are less productive than Hoopeston soils.

This soil is droughty in dry periods. Occasionally the water table is high in this soil. The organic-matter content is moderate.

This soil is used mainly for the cultivated crops commonly grown, but if irrigated it is suited to specialty crops. Capability unit IIs–3; woodland suitability group 3o1; wildlife group 4; recreation group 5.

Joslin Series

The Joslin series consists of nearly level to moderately sloping, well-drained soils on terraces. These soils formed in dominantly silty material and in the underlying reddish, clayey deposits. The native vegeta-

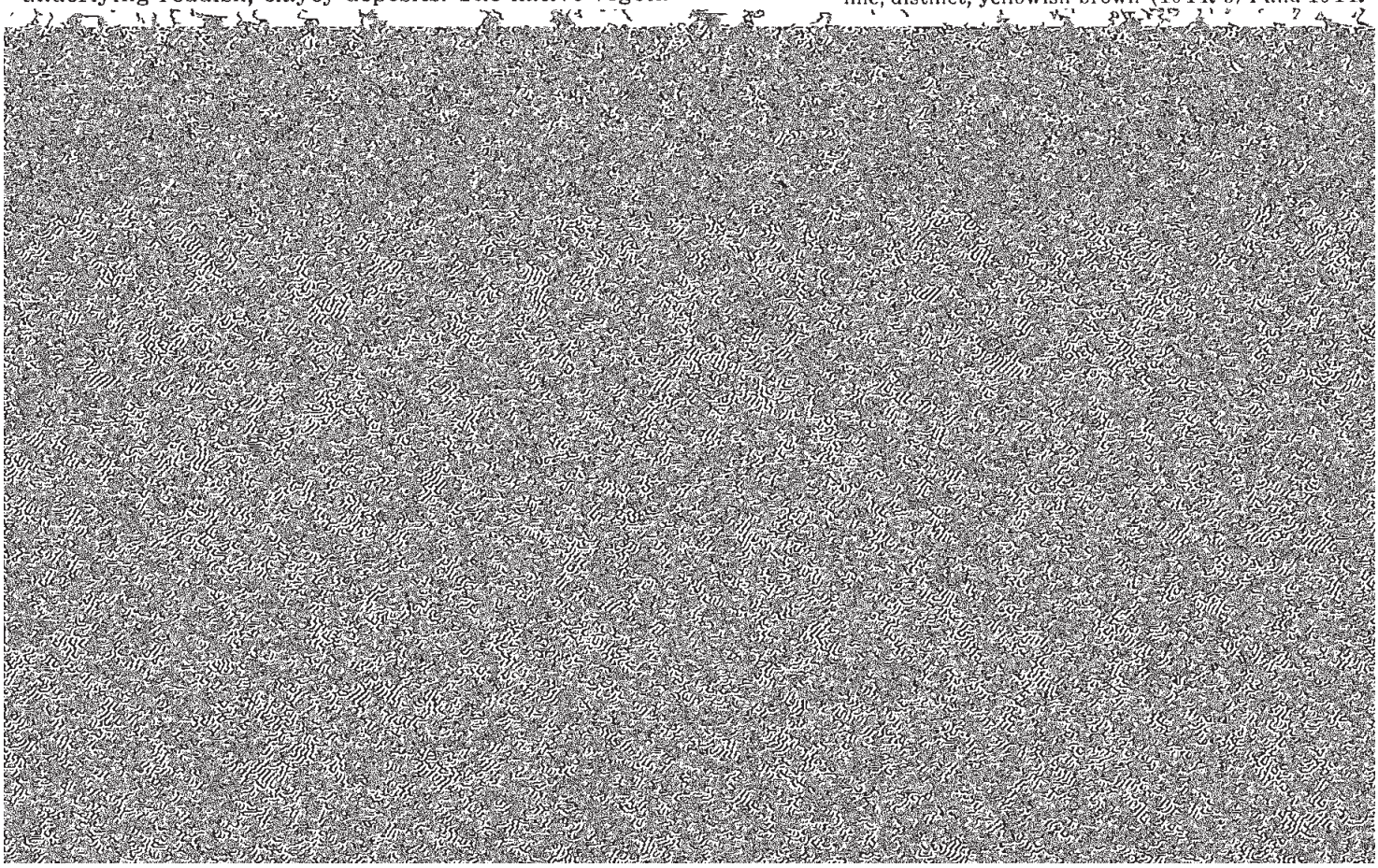
B21t—18 to 28 inches, brown to dark-brown (10YR 4/3) and some dark yellowish-brown (10YR 4/4) silt loam; thin, discontinuous, dark-brown (10YR 3/3) organic clay films on faces of peds; moderate, medium and coarse, subangular blocky structure; friable; some very dark grayish-brown (10YR 3/2) and very dark gray (10YR 3/1) root channel fillings and linings; few sand grains and pebbles; few worm casts; many pores; slightly acid; gradual, smooth boundary.

B22t—28 to 37 inches, yellowish-brown (10YR 5/4) and some dark yellowish-brown (10YR 4/4) silt loam; thin, discontinuous, brown to dark-brown (7.5YR 4/2) clay films on faces of peds; weak, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky and angular blocky; firm; some root channels filled with black (10YR 2/1) organic fillings; many sand grains; many pores; medium acid; gradual, smooth boundary.

B31t—37 to 48 inches, yellowish-brown (10YR 5/4) silt loam; thin, discontinuous, brown to dark-brown (7.5YR 4/2) clay films on faces of peds; weak, coarse, prismatic structure; friable; some root and worm channels filled with black (10YR 2/1) organic material; many fine pores; some spots of reddish-brown (2.5YR 4/4) clay from below; slightly acid; clear, smooth boundary.

IIB32t—48 to 60 inches, reddish-brown (2.5YR 4/4) silty clay; thin, continuous, weak-red (2.5YR 4/2) clay films on faces of peds; moderate, medium and coarse, prismatic structure; firm and very firm; some root channels; some channels with brownish-yellow (10YR 6/6) fillings; few fine root channels contain black (10YR 2/1) fillings; neutral; abrupt, smooth boundary.

IIIC—60 to 85 inches, grayish-brown (10YR 5/2) and light brownish-gray (10YR 6/2) silt loam; many, fine, distinct, yellowish-brown (10YR 5/4 and 10YR



This soil is moderate in organic-matter content.

This soil is used mainly for cultivated crops, but it is well suited to all crops commonly grown in the county. Capability unit I–1; woodland suitability group 2o1; wildlife group 1; recreation group 1.

Joslin silt loam, 2 to 6 percent slopes (763B).—This soil is on terrace ridges. Areas are elongated in the shape of the terrace, or are irregularly shaped and are in no apparent pattern. Most are less than 5 acres in size, but a few are more than 15 acres. The profile of this soil is similar to the one described as representative of the series, but the dark-colored surface layer is somewhat thinner.

Included with this soil in mapping are a few wet areas that are about 1 acre in size and are indicated on the soil map by a spot symbol. Included are soils similar to Joslin silt loam that have a surface layer low in organic matter content and other soils similar to Joslin silt loam that have slowly permeable, reddish clayey deposits at a depth of 24 to 40 inches. Also included are a few eroded, sloping soils that have sand between depths of 24 and 40 inches. These soils are more droughty than Joslin soils.

This Joslin soil is subject to erosion if slopes are improperly managed. The organic-matter content is moderate.

This soil is used mainly for cultivated crops, but is well suited to all crops commonly grown in the county. Capability unit IIe–1; woodland suitability group 2o1; wildlife group [illegible]

able; many dark grayish-brown (10YR 4/2) root channels; neutral; clear, smooth boundary.

B3—33 to 48 inches, grayish-brown (10YR 5/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles and common, medium, distinct, yellowish-brown (10YR 5/4) mottles; weak and moderate, coarse, prismatic structure; friable; dark grayish-brown (10YR 4/2) root channels; neutral; gradual, smooth boundary.

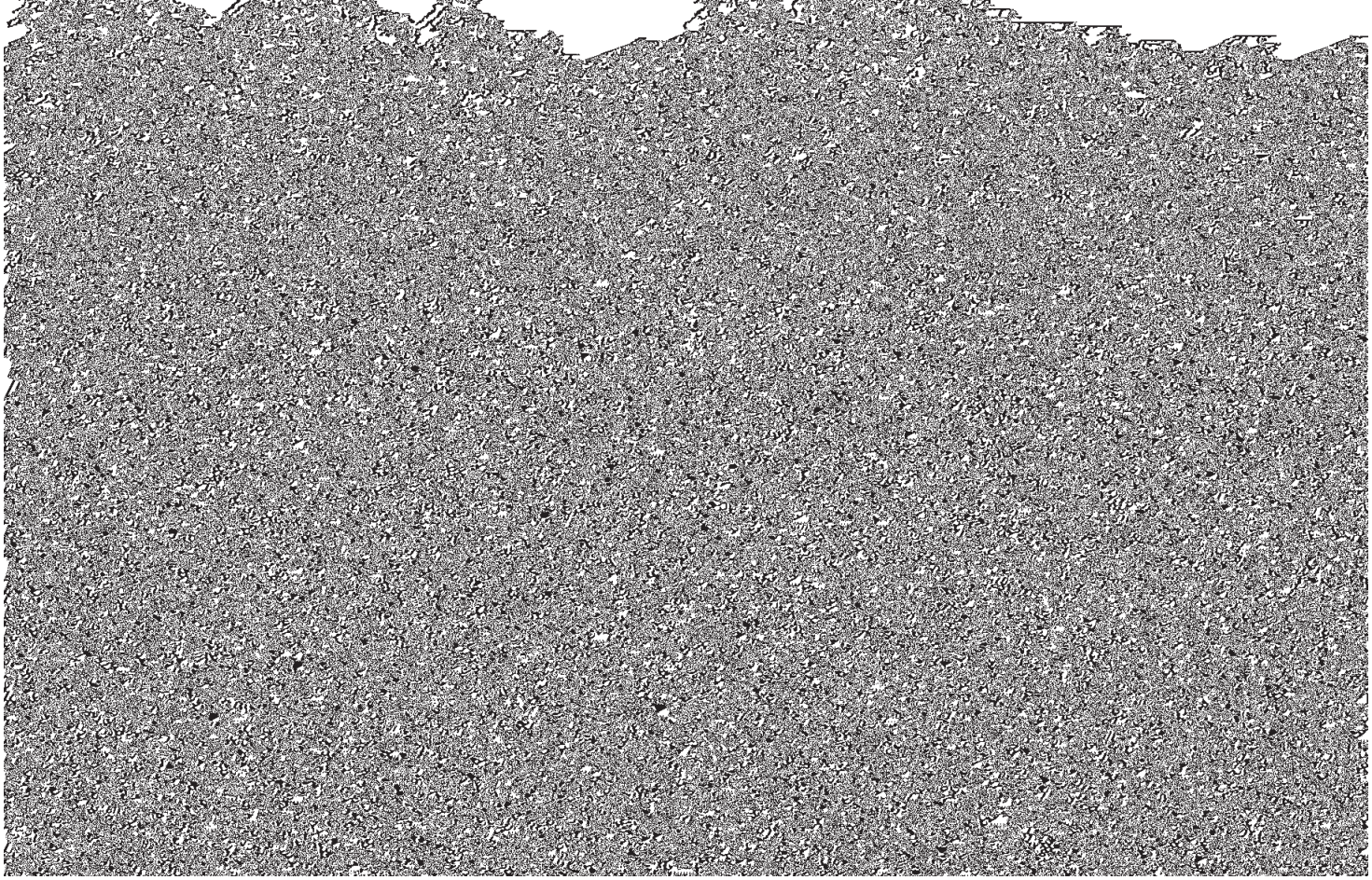
C—48 to 60 inches, light olive-gray (5YR 6/2) silt loam; few, medium, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/4) mottles; massive; dark grayish-brown (10YR 4/2) root channels; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The silt loam A horizon is 12 to 18 inches thick. The silt loam B horizon ranges from 30 to 45 inches in thickness. The silt loam C horizon ranges from slightly acid to moderately alkaline.

Joy soils formed in thick loess, as did Port Byron and Muscatine soils. They are more poorly drained than Port Byron soils. They have less clay in their B horizon than Muscatine soils.

Joy silt loam (275).—In most places this nearly level soil is below and between dunes, mainly at the lowest position in the landscape. Natural drainageways are a part of these areas. Most areas are less than 10 acres in size, but a few are more than 75 acres.

Included with this soil in mapping are a few poorly drained soils that are about 1 acre in size and are indicated on the soil map by the symbol for wet spots. Also included are several less productive, sandy areas that are about 1 acre in size and are indicated on the soil map by a spot symbol.



A21—4 to 8 inches, brown (10YR 5/3) and very dark gray (10YR 3/1) fine sandy loam; moderate, thin, platy structure; very friable; slightly acid; abrupt, smooth boundary.

A22—8 to 11 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; moderate, thin, platy structure; very friable; strongly acid; abrupt, smooth boundary.

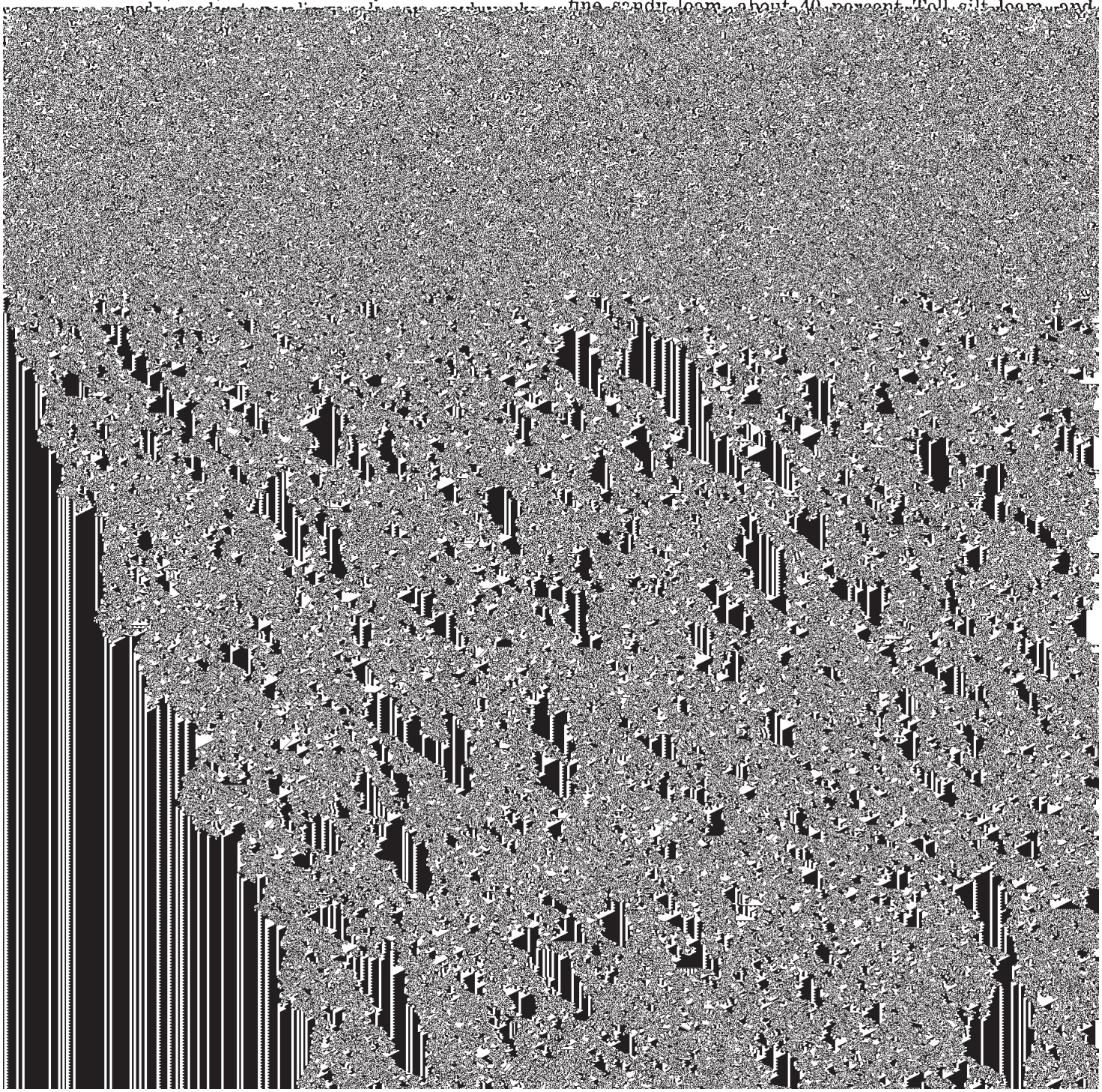
B21t—11 to 18 inches, brown (7.5YR 5/4) fine sandy loam; thin, discontinuous, dark-brown (7.5YR 4/4) clay films on faces of peds; moderate, fine and medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary.

B22t—18 to 28 inches, strong-brown (7.5YR 5/6) fine sandy loam; thin, discontinuous clay films on faces of

are droughty during seasonally dry periods. The organic-matter content is low.

These soils are used mainly for the cultivated crops commonly grown and for permanent pasture, but if irrigated they are suited to specialty crops. Capability unit IIIe–2; woodland suitability group 3s2; wildlife group 7; recreation group 3.

Lamont, Tell, and Bloomfield soils, 12 to 30 percent slopes, eroded (947F2).—In most places this mapping unit is on sides of some dunes or on side slopes of the dissected sandy uplands. It is about 40 percent Lamont fine sandy loam, about 40 percent Tell silt loam, and



middle of grassed lane, and 70 feet southeast at right angle to lane in the northwest corner of SW¼SW¼-NW¼ sec. 1, T. 16 N., R. 6 W.

A1—0 to 10 inches, dark-brown (10YR 3/3) loamy fine sand, brown (10YR 5/3) dry; weak, very fine, granular structure; very friable; neutral; abrupt, smooth boundary.

C1—10 to 26 inches, light yellowish-brown (10YR 6/4) loamy sand, very pale brown (10YR 7/3) dry; single grained; slightly acid; abrupt, smooth boundary.

C2—26 to 29 inches, yellowish-brown (10YR 5/4) and light yellowish-brown (10YR 6/4) loamy fine sand; weak, very fine, granular structure; very friable; neutral; clear, smooth boundary.

C3—29 to 39 inches, grayish-brown (10YR 5/2) and dark grayish-brown (10YR 4/2) loam; common, medium, faint, brown (10YR 4/3) mottles; weak, fine and medium, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

C4—39 to 42 inches, pale-brown (10YR 6/3) loamy sand, very pale brown (10YR 7/3) dry; weak, very fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

C5—42 to 60 inches, light yellowish-brown (10YR 6/4) sand, very pale brown (10YR 8/3) dry; single grained; loose; neutral.

The solum and the A horizon range from 10 to 20 inches in thickness and are neutral or mildly alkaline. The A horizon ranges from loamy fine sand to sandy loam. The stratified layers of the C horizon range from sand to silt loam. They range from slightly acid to moderately alkaline.

Because these soils are stratified in the C horizon, they are not in the defined range for the series, but this difference does not alter the usefulness or behavior of the soils.

Landes soils are on bottom lands, as are Coffeen and Radford soils. They are better drained and have appreciably more sand than Coffeen and Radford soils. They do not have the dark-colored buried silty clay loam soil typical of Radford soils.

Landes loamy fine sand (304).—This nearly level to gently sloping soil is on flood plains. Most areas are close to and are associated with the Mississippi and Rock Rivers. They are at a somewhat higher position in the landscape than surrounding soils. Areas are somewhat long and narrow and tend to parallel the river. Most are less than 10 acres in size, but a few are more than 50 acres.

Included with this soil in mapping are a few sandy, somewhat poorly drained areas where the water table is near the surface part of the year. Also included is a soil that has a silty clay loam layer at a depth below 40 inches. This soil is more productive than Landes soils because it has higher available water capacity.

This Landes soil is subject to flooding on unprotected bottom lands. The organic-matter content is very low.

This soil is used mainly for cultivated crops and urban development. It is droughty and not well suited to crops commonly grown in the county. It is suited to urban development in areas that are protected and not subject to flooding. Capability unit IVs–1; woodland suitability group 2o4; wildlife group 5; recreation group 6.

Lawler Series

The Lawler series consists of nearly level, somewhat poorly drained soils on terraces. These soils formed in loamy material and in the underlying sandy deposit under native prairie vegetation.

In a representative profile the surface layer is mainly black heavy loam about 15 inches thick. The subsoil, about 18 inches thick, is dark grayish brown and has brownish mottles. The upper 13 inches of it is light sandy clay loam, and the lower 5 inches is heavy loamy sand. The underlying material is yellowish-brown medium and coarse sand and fine gravel.

Lawler soils are moderately permeable and have moderate available water capacity. They are suited to all crops commonly grown in the county, but they are somewhat droughty and are better suited to drought-resistant crops.

Representative profile of Lawler loam, 395 feet east of centerline of ditch, and 17 feet south of east-west fence in the northeast corner of NW¼SE¼SE¼ sec. 10, T. 20 N., R. 2 E.

Ap—0 to 10 inches, black (10YR 2/1) heavy loam; weak, medium, subangular blocky structure parting to moderate, very fine and fine, granular; friable; medium acid; clear, smooth boundary.

A3—10 to 15 inches, black (10YR 2/1) and dark grayish-brown (10YR 4/2) heavy loam; few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; firm; medium acid; clear, smooth boundary.

B2—15 to 28 inches, dark grayish-brown (10YR 4/2) and some dark-gray (10YR 4/1) light sandy clay loam; many, fine, distinct, dark yellowish-brown (10YR 4/4), yellowish-brown (10YR 5/4), and dark-brown and brown (7.5YR 4/4) mottles; moderate, coarse, subangular blocky structure; friable; medium acid; gradual, smooth boundary.

IIB3—28 to 33 inches, dark grayish-brown (10YR 4/2) heavy loamy sand; many, fine, distinct, dark yellowish-brown (10YR 4/4), yellowish-brown (10YR 5/4), and dark-brown and brown (7.5YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; medium acid; clear, smooth boundary.

IIC—33 to 60 inches, yellowish-brown (10YR 5/4) medium and coarse sand and fine gravel; single grained; medium acid.

The solum ranges from 24 to 40 inches in thickness. The A horizon ranges from 12 to 18 inches in thickness and ranges from loam to silt loam. The loamy upper part of the B horizon ranges from loam to sandy clay loam, and it is 15 to 25 inches thick. In some places a IIB horizon occurs that is sandy loam or loamy sand. The IIC horizon ranges from gravelly loamy sand to sand and fine gravel.

Lawler soils are on terraces, as are Hoopeston and Waukee soils. They have less sand in their solum than Hoopeston soils. They are more poorly drained than Waukee soils.

Lawler loam (647).—In most places this nearly level soil is in lower, irregularly shaped areas between other soils. Most areas are less than 5 acres in size, but a few are more than 15 acres.

Included with this soil in mapping are small areas of Hoopeston soils that have more sand in the subsoil, are somewhat less productive, and are more droughty than Lawler soils.

This soil is somewhat droughty in dry periods. Occasionally the water table is high. The organic-matter content is moderate.

This soil is used mainly for the cultivated crops commonly grown in the county, but if irrigated it is suited to specialty crops. Capability unit IIs–3; woodland

suitability group 3o1; wildlife group 4; recreation group 5.

Lawson Series

The Lawson series consists of somewhat poorly drained, nearly level soils on bottom lands. These soils formed in silty alluvium.

In a representative profile the surface layer extends to a depth of 55 inches. The upper 6 inches is very dark gray silt loam, the next 40 inches is mainly black silt loam, the next 4 inches is black silty clay loam, and the lower 5 inches is very dark gray silt loam. The underlying material is grayish silty clay loam that has brownish mottles.

Lawson soils are moderately permeable and have very high available water capacity. They are well suited to all crops commonly grown in the county.

Representative profile of Lawson silt loam, 557 feet south of center of road along fence, and 154 feet east of fence in the southwest corner of NW¼NE¼NE¼ sec. 25, T. 16 N., R. 1 W.

Ap—0 to 6 inches, very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) and grayish brown (10YR 5/2) dry; moderate, very fine and fine, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

A12—6 to 12 inches, black (10YR 2/1) and very dark gray (10YR 3/1) silt loam; moderate, medium, subangular blocky structure parting to moderate, fine and medium, granular; friable; slightly acid; clear, smooth boundary.

A13—12 to 34 inches, black (10YR 2/1) silt loam; moderate, medium, subangular blocky structure parting to moderate, fine and medium, granular; friable; few dark-brown (10YR 3/3) organic stains; slightly acid; clear, smooth boundary.

A14—34 to 46 inches, black (10YR 2/1) silt loam; moderate, medium, subangular blocky structure parting to moderate, fine and medium, granular and slight tendency toward prismatic; friable; few dark-brown (10YR 3/3) organic stains; neutral; clear, smooth boundary.

A15—46 to 50 inches, black (10YR 2/1) light silty clay loam; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; firm; mildly alkaline; clear, smooth boundary.

A16—50 to 55 inches, very dark gray (10YR 3/1) heavy silt loam; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; friable; mildly alkaline; abrupt, smooth boundary.

Cg—55 to 60 inches, gray to light-gray (5Y 6/1) light silty clay loam; few, fine, prominent, dark yellowish-brown (10YR 4/4) mottles; massive; mildly alkaline.

The A horizon commonly ranges from 36 to 48 inches in thickness but, in places, ranges from 24 to 60 inches. It is black or very dark gray. It is mainly silt loam, but it is individual thin layers of silty clay loam in places. The C horizon is mainly silt loam, but it is stratified layers of silty clay loam, clay loam, loam, sandy loam, or sand in places. The soils range from slightly acid to alkaline.

Lawson soils are on bottom lands, as are Radford and Coffeen soils. They do not have the dark-colored silty clay loam buried horizon characteristic of Radford soils. They have a thicker dark-colored A horizon than Coffeen soils.

Lawson silt loam (451).—This nearly level soil is on flood plains. Most areas are on narrow bottom lands that extend from broader flood plains onto prairie uplands. A few are within broad flood plains of major rivers and creeks. Most areas are less than 20 acres in size, but a few are more than 180 acres.

Included with this soil in mapping are less productive sandy areas about an acre in size that are indicated on the soil map by a spot symbol. A few wet areas, about an acre in size, are indicated on the soil map by a spot symbol. Also included are some areas, about 1 acre in size, where slopes are short and narrow. These areas are indicated on the soil map by the symbol for escarpments.

This soil is subject to flooding on unprotected bottom lands. Occasionally the water table is high. The organic-matter content is high.

This soil is used mainly for cultivated crops and is suited to this use. The degree of suitability for any use in areas subject to overflow depends on the frequency and duration of flooding. Capability unit I–3; woodland suitability group 2o4; wildlife group 5; recreation group 6.

Marsh

Marsh (718) in many places is in low depressions that do not have material drainage outlets. Areas are covered with water for long periods. Most areas are in long and narrow sloughs. Some are parallel and adjacent to large bodies of water. Most are less than 20 acres in size, but a few are more than 80 acres. Marsh is mainly silty alluvium and organic material.

Most areas are used as habitat for wetland wildlife and are well suited to this use. Capability unit unassigned; woodland suitability group unassigned; wildlife group 6; recreation group 8.

Martinsville Series

The Martinsville series consists of well-drained, gently sloping to moderately steep soils on terraces and moderately sloping to steep soils on uplands. These soils formed in loamy outwash under native timber vegetation.

In a representative profile the surface layer is very dark grayish-brown loam about 3 inches thick. The subsurface layer is dark grayish-brown and brown loam about 9 inches thick. The subsoil is about 30 inches thick. The upper 16 inches of it is yellowish-brown loam and light clay loam, the next 8 inches is yellowish-brown clay loam, and the lower 6 inches is yellowish-brown silty clay loam mottled with light gray. The underlying material is yellowish-brown, gray, brown, and strong brown, stratified silt loam, loam, sandy loam, sand, clay loam, and silty clay loam.

Martinsville soils are moderately permeable and have high available water capacity. They are suited to the cultivated crops commonly grown if erosion is adequately controlled. Some slopes are too steep for row crops and are better suited to grasses, legumes, or trees.

Representative profile of Martinsville silt loam, 2 to 7 percent slopes, 600 feet north of south section line along blacktop road and 68 feet west of center of New Boston blacktop road on north side of ditchbank in the SE¼NW¼SW¼ sec. 7, T. 16 N., R. 5 W.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) loam, gray (10YR 6/1) dry; moderate, very fine and fine, granular structure; friable; medium acid; clear, smooth boundary.

A21—3 to 8 inches, dark grayish-brown (10YR 4/2) and some brown (10YR 4/3) loam; weak, very thin, platy structure; friable; medium acid; clear, boundary.

A22—8 to 12 inches, brown (10YR 4/3) and some dark grayish-brown (10YR 4/2) loam; weak, thin, platy structure; friable; few pebbles; slightly acid; clear, smooth boundary.

B1—12 to 18 inches, yellowish-brown (10YR 5/6) loam; moderate, fine, subangular and angular blocky structure; friable; few pebbles; slightly acid; clear, smooth boundary.

B21t—18 to 28 inches, yellowish-brown (10YR 5/6) light clay loam; moderately thick, discontinuous, dark yellowish-brown (10YR 4/4) clay films on faces of peds; moderate, medium, subangular and angular blocky structure; friable; few pebbles; medium acid; clear, smooth boundary.

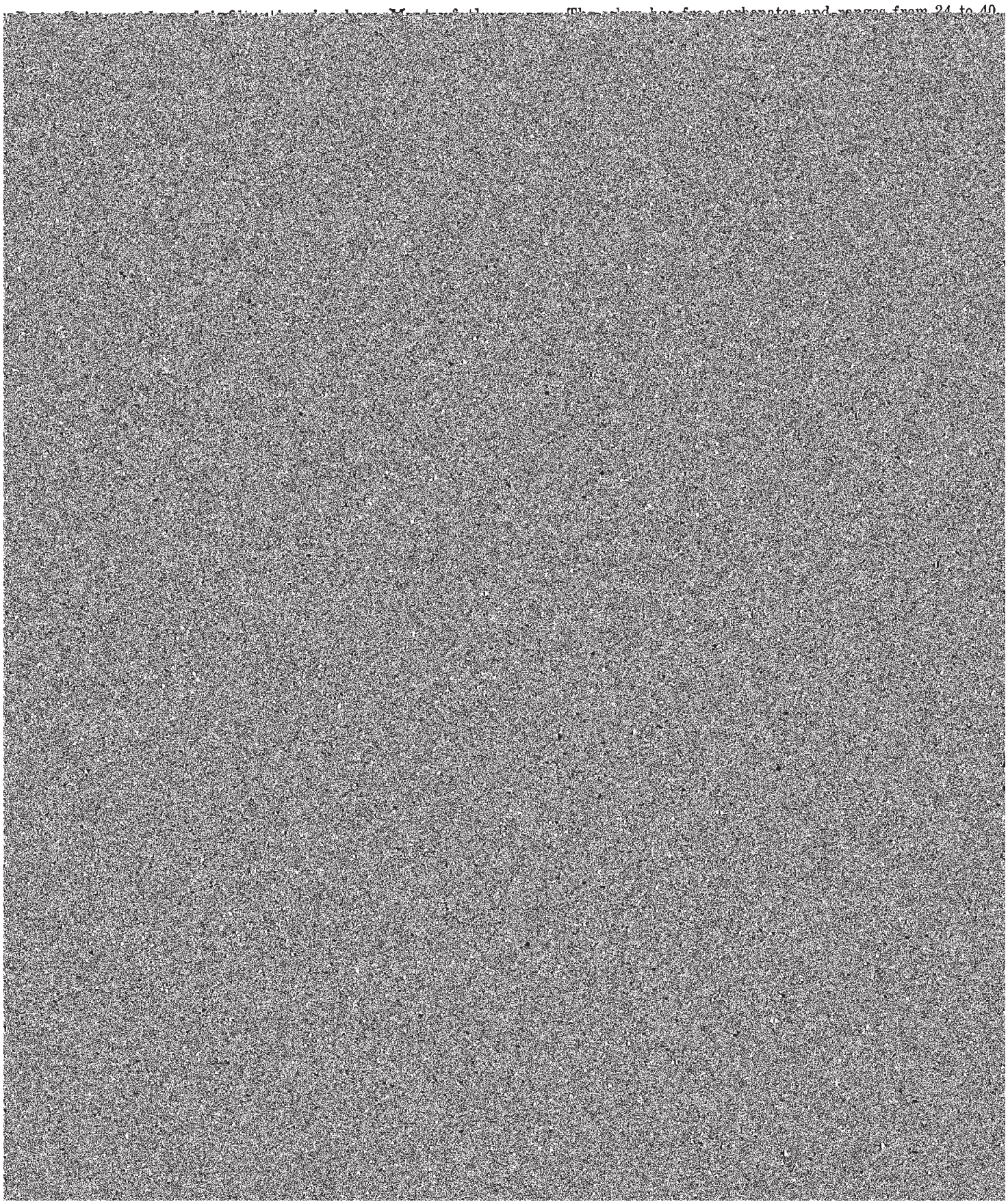
B22t—28 to 36 inches, yellowish-brown (10YR 5/4) clay loam; moderately thick, discontinuous, dark-brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4) clay films on faces of peds; few, fine and

are a few acres of nearly level Martinsville soils that are not subject to erosion and some moderately sloping, eroded areas. Also included are severely eroded areas that are less than 1 acre in size and are indicated on the soil map by a spot symbol. Because these areas are eroded, runoff is increased, tilth is poor, and organic-matter content is lower.

This soil is subject to erosion if slopes are improperly managed. The organic-matter content is moderately low.

This soil is used mainly for cultivated crops, but is suited to all crops commonly grown in the county. Capability unit IIe–1; woodland suitability group 2o1; wildlife group 1; recreation group 1.

Martinsville soils, 7 to 12 percent slopes, severely eroded (570D3).—In most places these soils are on short sides or at upper ends of upland valleys below less sloping ridgetops. A few areas are on short sides



few pebbles. The subsoil is 12 inches thick. The upper 8 inches of it is black silty clay and some pebbles, and the lower 4 inches is dark-gray silty clay loam that has yellowish-brown mottles and a few pebbles and rock fragments. White limestone bedrock is at a depth of 27 inches.

Millsdale soils are slowly to moderately slowly permeable and have moderate available water capacity.

These soils are better suited to plants that need only a shallow root zone than to most others. Those selected need to be tolerant of a seasonally high water table.

Representative profile of Millsdale silty clay loam, 220 feet north from west corner post in east-west fence and 225 feet east from the center of road into

This soil is used mainly for cultivated crops or pasture, but a few areas are used for urban development. It is better suited to uses not limited by a seasonally high water table or the presence of limestone bedrock than to most others. Capability unit IIIw–1; woodland suitability group 2w3; wildlife group 6; recreation group 7.

Mixed Alluvial Land

Most areas of Mixed alluvial land (455) are on nearly level islands and in areas outside of levees adjacent and parallel to the Mississippi and Rock Rivers. Other

feet east of north-south fence in the northwest corner of NW¼NW¼NE¼ sec. 29, T. 17 N., R. 2 W.

Ap—0 to 8 inches, very dark gray (N 3/0) silty clay loam; moderate, fine and medium, subangular blocky and angular blocky structure parting to weak, fine and medium, granular; firm; mildly alkaline; abrupt, smooth boundary.

A12—8 to 14 inches, black (N 2/0) medium silty clay loam; moderate, fine and medium, granular structure; friable; mildly alkaline; clear, smooth boundary.

A13—14 to 21 inches, very dark gray (N 3/0) light silty clay; weak, fine and medium, angular blocky and subangular blocky structure parting to moderate, fine and medium, granular; friable; mildly alkaline; clear, smooth boundary.

B21g—21 to 34 inches, dark-gray (N 4/0 and 5Y 4/1) light silty clay; common, fine, distinct, brown to dark-brown (7.5YR 4/4) mottles; moderate, medium, prismatic structure parting to weak, fine and medium, subangular blocky; firm; mildly alkaline; clear, smooth boundary.

B22g—34 to 46 inches, gray (5Y 5/1) and a variegated pattern of dark reddish-brown (2.5YR 3/4) and reddish-brown (5YR 4/4) light silty clay; moderate, medium, prismatic structure parting to moderate, fine and medium, subangular blocky; firm; mildly alkaline; clear, smooth boundary.

IIB23—46 to 56 inches, reddish-brown (2.5YR 4/4) and a variegated pattern of weak-red (2.5YR 4/2), dark-gray (N 4/0), and gray (N 5/0) light clay; moderate, medium, prismatic structure; firm; mildly alkaline; clear, smooth boundary.

IIB24—56 to 64 inches, reddish-brown (2.5YR 4/4) clay; gray (N 5/0) veins throughout; weak, medium, subangular blocky structure; firm; mildly alkaline; abrupt, smooth boundary.

IIIC—64 to 74 inches, light-gray to gray (10YR 6/1) light silty clay loam; common, fine and medium, distinct, yellowish-brown mottles; massive; mildly alkaline.

The solum ranges from 48 to 72 inches in thickness. The depth to the reddish IIB horizon ranges from 40 to 60 inches. The A horizon ranges from 15 to 24 inches in thickness, and from black to very dark gray. It is silty clay loam or silty clay. The gleyed, grayish B horizon is 20 to 30 inches thick. It ranges from heavy silty clay loam to silty clay. The reddish, clayey IIB horizon is 6 to 18 inches thick. It is light silty clay or clay. The IIIC horizon is commonly silt loam but is layers of silty clay loam, loam, clay loam, sand, or fine gravel in places. Reaction ranges from slightly acid to mildly alkaline throughout the profile.

The reddish color in the IIB horizon is not in the defined range for the series, but this difference does not alter the usefulness or behavior of the soils.

Montgomery soils formed in clayey deposits, as did Wabash and Niota soils. They have a thinner dark-colored A horizon than Wabash soils. They do not have an A2 horizon, which is characteristic of Niota soils, and they have more clay in their A horizon than those soils.

Montgomery silty clay loam (465).—This nearly level soil is on broad terraces. Areas are irregularly shaped and in most places are in the lowest position in the landscape. Most areas are less than 10 acres in size, but a few are more than 80 acres.

Included with this soil in mapping are a few wet areas that are less than 1 acre in size and are indicated on the soil map by the symbol for wet spots. Also included are some areas, about 1 acre in size, where

This soil is used mainly for cultivated crops, but it is better suited to crops tolerant of a seasonally high water table and a clayey subsoil than to most others. Capability unit IIIw–1; woodland suitability group 2w6; wildlife group 6; recreation group 7.

Muscatine Series

The Muscatine series consists of somewhat poorly drained, nearly level soils on uplands. These soils formed in loess under native grass vegetation.

In a representative profile the surface layer is mainly very dark brown and black silt loam about 20 inches thick. The subsoil is 37 inches thick. The upper 6 inches of it is brown to dark-brown silty clay loam, the next 23 inches is light brownish-gray silty clay loam, and the lower 8 inches is gray to light-gray heavy silt loam. The subsoil is mottled throughout with yellowish brown. The underlying material is gray silt loam mottled with yellowish brown.

Muscatine soils are moderately permeable and have very high available water capacity. They are well suited to all crops commonly grown in the county.

Representative profile of Muscatine silt loam, 275 feet north of west corner of east-west fence, and 35 feet east of road fence in the northwest corner of SW¼SW¼NW¼ sec. 20, T. 16 N., R. 2 W.

Ap—0 to 7 inches, very dark brown (10YR 2/2) heavy silt loam, very dark grayish brown (10YR 3/2) dry; massive parting to moderate, very fine to medium, granular structure; friable, firm if massive; neutral; abrupt, smooth boundary.

A12—7 to 14 inches, black (10YR 2/1) heavy silt loam; moderate, very fine to medium, granular structure; friable; slightly acid; clear, smooth boundary.

A3—14 to 20 inches, very dark gray (10YR 3/1) and some brown (10YR 5/3) silty clay loam; moderate, fine and medium, granular structure; friable; medium acid; clear, smooth boundary.

B21t—20 to 26 inches, brown to dark-brown (10YR 4/3) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/8) and strong-brown (7.5YR 5/6 and 5/8) mottles; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films on faces of peds; moderate, medium and coarse, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B22t—26 to 34 inches, light brownish-gray (10YR 6/2) heavy silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/6 and 5/8) mottles; thin, discontinuous, dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) clay films on faces of peds; weak, fine, prismatic structure parting to moderate, medium, subangular blocky; friable; very dark brown (10YR 2/2) iron-manganese concretions; medium acid; gradual, smooth boundary.

B23t—34 to 49 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine and medium, prominent, yellowish-brown (10YR 5/6 and 5/8) mottles; thin, discontinuous, grayish-brown (10YR 5/2) clay films on faces of peds; moderate, coarse, prismatic structure; firm; few very dark brown (10YR

C—57 to 60 inches, gray to light-gray (10YR 6/1) silt loam; many, fine and medium, prominent, yellowish-brown (10YR 5/6 and 5/8) mottles; massive; friable; neutral.

The solum ranges from 40 to 60 inches in thickness. The

A2—7 to 14 inches, grayish-brown (10YR 5/2), dark grayish-brown (10YR 4/2), and very dark gray (10YR 3/1) silt loam; moderate, thin, platy structure; friable; few iron-manganese concretions and some patchy, light-gray (10YR 7/1), uncoated silt

Oakville Series

The Oakville series consists of well-drained, gently sloping to strongly sloping soils on terraces and moderately sloping to very steep soils on uplands. These soils formed in sandy deposits under native timber vegetation.

In a representative profile the surface layer is dark grayish-brown and very dark grayish-brown loamy fine sand about 8 inches thick. The subsoil is about 10

suitability group 4s2; wildlife group 7; recreation group 3.

Oakville fine sand, 12 to 60 percent slopes (741F).—In most places this soil is on the sides of dunes or on side slopes in dissected sandy uplands. Most areas are less than 40 acres in size. The profile of this soil is similar to the one described as representative of the series, but the subsoil is thinner.

Included with this soil in mapping are a few areas where the surface layer is thicker and darker colored

Ab—27 to 45 inches, black (10YR 2/1) silt loam; dark grayish-brown (2.5Y 4/2) mottles in streaks and in worm channel fillings in upper 6 inches; weak and moderate, fine, subangular blocky structure parting to granular; friable; fine silica grains; many fine pores; neutral.

The silt loam A horizon and C horizon have a combined thickness of 20 to 40 inches. They range from slightly acid to mildly alkaline. The dark-colored buried soil ranges from silt loam to silty clay loam and is 10 to 30 inches thick. It is slightly acid to neutral.

Ap—0 to 7 inches, very dark gray (10YR 3/1) and some dark grayish-brown (10YR 4/2) silt loam; massive parting to moderate, very fine to medium, granular structure; friable; some light-gray (10YR 7/2) dry silt loam at a depth of 6 to 7 inches has strong, thin, platy structure; recent overwash; mildly alkaline; abrupt, smooth boundary.

A12—7 to 19 inches, black (10YR 2/1) silty clay loam, upper part very dark gray (10YR 3/1); few, fine, distinct, dark yellowish-brown (10YR 3/4) and pale-brown (10YR 6/3) mottles; moderate, me-

circular or oblong in shape and are less than 10 acres in size. This soil has a profile similar to the one described as representative of the series, but it is wet during most of the year.

Included with this soil in mapping are some areas, about 1 acre in size, where slopes are short and narrow. These areas are indicated on the soil map by the symbol for escarpments. A few areas of Marsh that are less than 1 acre in size are included. Also included are several areas of muck in the vicinity of the city of Silvis.

C—47 to 60 inches, mottled grayish-brown (2.5Y 5/2), yellowish-brown (10YR 5/6), and dark-brown (7.5YR 4/4) silt loam; massive; few iron-manganese concretions; slightly acid.

The solum ranges from 40 to 60 inches in thickness. The silt loam A horizon ranges from 10 to 20 inches in thickness. The silt loam B horizon ranges from 30 to 40 inches in thickness. The silt loam C horizon ranges from medium acid to moderately alkaline.

Port Byron soils formed in thick loess, as did Tama and Joy soils. They have less clay in their B horizon than Tama soils. They are better drained than Joy soils.

square in shape, but some are confined within irregular property lines. One quarry that occupies an entire island in the Rock River is spherical in shape. A few limestone quarries are small, but some are more than 200 acres in size.

The limestone rock is excavated to a depth of many feet, and hard rock is exposed in the remaining area.

Unless reclaimed by addition of fertile fill material, areas are limited mainly to uses not affected by hard rock. Spoil material removed in excavation is adjacent to most areas. This material is part of the limestone quarry, or in places is fill material. Most limestone quarries are idle or are used for trash collection. Quarry is not assigned to a capability unit or a woodland, wildlife, or recreation group.

Raddle Series

The Raddle series consists of moderately well drained and well drained, nearly level to moderately sloping soils on terraces. These soils formed in silty material under native prairie vegetation.

In a representative profile the surface layer is mainly black and very dark gray silt loam about 19 inches thick. The subsoil is silt loam about 29 inches thick. The upper 7 inches of it is brown to dark brown, the next 16 inches is yellowish brown, and the lower 6 inches is pale brown mottled with yellowish brown. The underlying materal is stratified layers of yellowish-brown loamy sand and grayish-brown silt loam mottled with yellowish brown.

Raddle soils are moderately permeable and have very high available water capacity. They are well suited to all crops commonly grown in the county.

Representative profile of Raddle silt loam, 0 to 2 percent slopes, 150 feet east and 20 feet north of section line corner in field in the southwest corner of SW¼-SW¼NW¼ sec. 19, T. 17 N., R. 1 W.

Ap—0 to 9 inches, black (10YR 2/1) silt loam, gray (10YR 5/1) dry; compact parting to moderate, very fine and fine, granular structure; friable; many sand grains; medium acid; clear, smooth boundary.

A12—9 to 19 inches, very dark gray (10YR 3/1) silt loam in upper part and very dark gray (10YR 3/1) and dark-brown (10YR 3/3) silt loam in lower part; compact parting to moderate, very fine and fine, granular structure; friable; many sand grains; slightly acid; clear, smooth boundary.

B1—19 to 26 inches, brown to dark-brown (10YR 4/3) silt loam; thin, discontinuous, dark grayish-brown (10YR 4/2) organic films on faces of peds; weak, medium, prismatic structure; friable; many sand grains; slightly acid; clear, smooth boundary.

B2—26 to 42 inches, yellowish-brown (10YR 5/4) silt loam; thin, grayish-brown (10YR 5/2) clay films that are continuous on vertical faces of peds; weak, coarse, prismatic structure; friable; many sand grains; neutral; clear, smooth boundary.

B3—42 to 48 inches, pale-brown (10YR 6/3) silt loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, prismatic structure; friable; many sand grains; few black iron-manganese concretions; neutral; abrupt, smooth boundary.

IIC1—48 to 52 inches, yellowish-brown (10YR 5/4) fine sandy loam; single grained; neutral; abrupt, smooth boundary.

IIIC2—52 to 71 inches, grayish-brown (10YR 5/2) silt loam; many, fine, prominent, yellowish-brown (10YR 5/4 and 5/6) mottles; massive; neutral; gradual, smooth boundary.

The solum ranges from 40 to 60 inches in thickness. The A horizon ranges from 10 to 20 inches in thickness and from black to dark brown. It is silt loam or loam. The B horizon ranges from 30 to 40 inches in thickness. It is silt loam or loam. The C horizon is commonly stratified loam, silt loam, and sandy loam, but has layers of sand and loamy sand in places. It is medium acid to mildly alkaline.

Raddle soils are on terraces, as are Joslin and Coyne soils. They do not have the reddish IIB horizon that is characteristic of Joslin and Coyne soils.

Raddle silt loam, 0 to 2 percent slopes (430A).—This soil is in areas that are in no apparent pattern and are irregularly shaped. Most areas are less than 25 acres in size, but a few are more than 160 acres. This soil has the profile described as representative of the series.

Included with this soil in mapping are a few areas of soils that have a thinner surface layer and are lower in content of organic matter than Raddle soils. Included are soils that have a surface layer of fine sandy loam, which is easily blown by wind. Also included are sandy areas that are about 1 acre in size and are indicated on the soil map by a spot symbol.

This soil is moderate in content of organic matter.

This soil is used mainly for cultivated crops, but it is well suited to all crops commonly grown in the county. Capability unit I–1; woodland suitability group 1o1; wildlife group 1; recreation group 1.

Raddle silt loam, 2 to 6 percent slopes (430B).—This soil is on terraces, commonly at the foot slopes to adjacent hills. Areas are mainly irregularly shaped but extend out from uplands. In places areas are elongated in the shape of terraces. Most are less than 20 acres in size, but a few are more than 60 acres.

Included with this soil in mapping are a few areas of soils that have a thinner surface layer and are lower in content of organic matter than Raddle soils and a few that have a thicker surface layer and are higher in content of organic matter than Raddle soils. Included are several areas of soils that have a surface layer of fine sandy loam, which is easily blown by wind. Other sandy areas that are about 1 acre in size and severely eroded areas that are about 1 acre in size are indicated on the soil map by a spot symbol. Also included are several areas where limestone bedrock crops out, and these areas are indicated on the soil map by the symbol for outcrops.

This soil is subject to erosion if slopes are improperly managed. The organic-matter content is moderate.

This soil is used mainly for cultivated crops, but it is well suited to all crops commonly grown in the county. Capability unit IIe–1; woodland suitability group 1o1; wildlife group 1; recreation group 1.

Radford Series

The Radford series consists of somewhat poorly drained, nearly level soils on bottom lands. These soils formed in silty alluvium.

In a representative profile the surface layer is very dark gray silt loam about 10 inches thick. The underlying material to a depth of about 27 inches is very dark gray silt loam stratified with grayish brown. Below this to a depth of about 51 inches is black silty clay loam. Below a depth of 51 inches is dark-gray silty clay loam mottled with yellowish brown.

Radford soils are moderately permeable and have very high available water capacity. They are well suited to all crops commonly grown in the county.

Representative profile of Radford silt loam, 131 feet south of east-west section line and 162 feet west of north-south section line in the southeast corner of NE¼NE¼NE¼ sec. 30, T. 17 N., R. 1 W.

Ap—0 to 10 inches, very dark gray (10YR 3/1) silt loam; weak, medium, subangular blocky structure parting to strong, very fine and fine, granular; friable; neutral; clear, smooth boundary.

C—10 to 27 inches, very dark gray (10YR 3/1) silt loam stratified with some grayish brown (10YR 5/2); common, fine, distinct, dark-brown and brown (7.5YR 4/4 and 10YR 4/3) and dark-brown (7.5YR 3/2) mottles; moderate, medium, platy structure; friable; neutral; lower 3 inches has same structure as IIA1b horizon; gradual, smooth boundary.

IIA1b—27 to 51 inches, black (10YR 2/1) silty clay loam; few, fine, faint, dark-brown (7.5YR 3/2) mottles in lower 4 inches; few black (N 2/0) iron-manganese concretions in lower 4 inches; moderate, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky; friable; neutral; upper 2 inches has ½-inch sandy loam lenses; gradual, smooth boundary.

IIB2b—51 to 64 inches, dark-gray (N 4/0) silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/6 and 5/8) and dark yellowish-brown (10YR 4/4) mottles; few black (N 2/0) iron-manganese concretions; strong, medium, prismatic structure; firm; neutral.

The silt loam A horizon and C horizon combined ranges from 20 to 40 inches in thickness and from slightly acid to mildly alkaline. The A horizon ranges from 6 to 10 inches in thickness, and from black to very dark grayish brown. The dark-colored silty clay loam buried soil ranges from 10 to 30 inches in thickness. It is slightly acid or neutral.

Radford soils are on bottom lands, as are Sawmill and Orion soils. They are better drained and have less clay in the upper part of the solum than Sawmill soils. They have a darker colored silt loam A horizon than Orion soils.

Radford silt loam (74).—This nearly level soil is on narrow bottom lands that extend onto prairies on uplands from broader flood plains. Most areas are less than 25 acres in size, but a few are more than 200 acres.

Included with this soil in mapping are areas where the silt loam is less than 20 inches thick. These areas tend to have a higher water table part of the year. A few poorly drained soils that are about 1 acre in size are indicated on the soil map by the symbol for wet spots. Also included are less productive sandy areas that are about 1 acre in size and are indicated on the soil map by a spot symbol.

Occasionally the water table is high in this soil. Flooding is a hazard on unprotected bottom lands. The organic-matter content is moderate.

This soil is used mainly for cultivated crops and is suited to this use. The degree of suitability for any use in areas subject to overflow depends on the frequency and duration of flooding. Capability unit I–3; woodland suitability group 2o4; wildlife group 5; recreation group 6.

Rozetta Series

The Rozetta series consists of moderately well drained, nearly level soils on uplands. These soils formed in deep loess under native timber vegetation.

In a representative profile the surface layer is dark grayish-brown, brown to dark-brown, and yellowish-brown silt loam about 8 inches thick. The subsoil is silty clay loam about 54 inches thick. The upper 13 inches of it is dark yellowish brown and has many black iron-manganese concretions; the next 20 inches is yellowish brown, has brown to dark-brown and light brownish-gray mottles, and has many black iron-manganese concretions; and the lower 21 inches is mottled yellowish brown, light brownish gray, and brown to dark brown and has many black iron-manganese concretions. The underlying material is mottled silt loam that has many iron-manganese concretions.

Rozetta soils are moderately permeable and have high to very high available water capacity. They are well suited to all crops commonly grown in the county.

Representative profile of Rozetta silt loam, 471 feet west along road fence from center of lane to homestead and 48 feet north in the southwest corner of SE¼-SW¼SE¼ sec. 1, T. 18 N., R. 1 E.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2), brown to dark-brown (10YR 4/3), and yellowish-brown (10YR 5/4) silt loam, yellowish brown (10YR 5/4) and pale brown (10YR 6/3) dry; strong, thick and very thick, platy structure to a depth of 4 inches and moderate, very fine and fine, granular structure below that depth; friable; platy structure due to compaction; numerous, black (N 2/0) iron-manganese concretions; few fine pores; neutral; abrupt, smooth boundary.

B1t—8 to 12 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; thin, discontinuous, brown and dark-brown (10YR 4/3) clay films on faces of peds; moderate, fine, subangular blocky structure; friable; many, light-gray (10YR 7/1) dry, uncoated silt grains on faces of peds; many black (N 2/0) iron-manganese concretions; few fine pores; neutral; clear, smooth boundary.

B21t—12 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; thin, continuous, brown to dark-brown (10YR 4/3) clay films on faces of peds; strong, fine and medium, angular blocky and subangular blocky structure, slight tendency to prismatic; firm; many, light-gray (10YR 7/1) dry, uncoated silt grains; many black (N 2/0) iron-manganese concretions; few fine pores; strongly acid; clear, smooth boundary.

B22t—21 to 31 inches, yellowish-brown (10YR 5/4) silty clay loam; common, fine, prominent, brown to dark-brown (7.5YR 4/4) and light brownish-gray (2.5Y 6/2) mottles; thin, continuous, brown to dark-brown (10YR 4/3) clay films on faces of peds; moderate, medium, prismatic structure parting to strong, fine and medium, angular blocky and subangular blocky; firm; many, light-gray (10YR 7/1) dry, uncoated silt grains; many black (N 2/0) iron-manganese concretions; some fine pores; strongly acid; clear, smooth boundary.

B23t—31 to 41 inches, yellowish-brown (10YR 5/4) silty clay loam; many, fine, prominent, brown to dark-brown (7.5YR 4/4) and light brownish-gray (2.5Y 6/2) mottles; thin, discontinuous, brown to dark-brown (10YR 4/3) clay films on faces of peds; weak, coarse, prismatic structure; firm; many, light-gray (10YR 7/1) dry, uncoated silt grains on faces of peds; many black (N 2/0) iron-manganese concretions; many fine pores; strongly acid; gradual, smooth boundary.

B3t—41 to 62 inches, mottled yellowish-brown (10YR 5/4), light brownish-gray (2.5Y 6/2), and brown to dark-brown (7.5YR 4/4) light silty clay loam; thin, patchy, brown to dark-brown (10YR 4/3) clay films on faces of peds; weak, coarse, pris-

matic structure; firm; many, light-gray (10YR 7/1) dry, uncoated silt grains; many black (N 2/0) iron-manganese concretions; many fine pores; strongly acid; clear, smooth boundary.

C—62 to 68 inches, mottled yellowish-brown (10YR 5/4), light brownish-gray (2.5Y 6/2), and brown to dark-brown (7.5YR 4/4) silt loam; brown to dark-brown (10YR 4/3) films in root channels; massive; many black (N 2/0) iron-manganese concretions; few fine pores; medium acid.

The solum ranges from 48 to 72 inches in thickness. The silt loam A horizon ranges from 6 to 10 inches in thickness.

A12—6 to 18 inches, black (10YR 2/1) light silty clay loam; weak, fine and medium, granular structure; friable; medium acid; clear, smooth boundary.

A3—18 to 23 inches, very dark gray (10YR 3/1) silty clay loam; few, fine, distinct, grayish-brown (2.5Y 5/2) mottles; weak, medium, prismatic structure parting to moderate, coarse, granular; friable; medium acid; clear, smooth boundary.

B2g—23 to 45 inches, olive-gray (5Y 5/2) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) and light olive-brown (2.5Y 5/4) mottles; thin, discontinuous, very dark gray (N 3/0) and dark-

brown, and the lower 7 inches is brown and dark brown. The underlying material is mainly yellowish-brown and dark-brown medium and coarse sand and fine gravel.

Saude soils are somewhat droughty. They are moderately rapidly permeable and have moderate available water capacity. They are suited to all crops commonly grown in the county, but they are better suited to drought-resistant crops.

Representative profile of Saude loam in an area of Burkhardt-Saude complex, 0 to 4 percent slopes, 77 feet east of north-south road fence and 43 feet north of east-west fence in the southwest corner of SW¼NW¼-SE¼ sec. 10, T. 20 N., R. 2 E.

Ap—0 to 9 inches, very dark gray (10YR 3/1) loam; massive parting to moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

A12—9 to 14 inches, very dark gray (10YR 3/1) light loam; weak, coarse, subangular blocky structure parting to moderate, fine and medium, granular; friable; medium acid; clear, smooth boundary.

B1—14 to 22 inches, very dark gray (10YR 3/1), very dark grayish-brown (10YR 3/2), and dark-brown (7.5YR 3/2) loam; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; friable; strongly acid; clear, smooth boundary.

B2—22 to 29 inches, brown and dark-brown (7.5YR 4/4) loam; moderate, discontinuous, dark-brown (7.5YR 3/2) organic clay coatings on faces of peds; weak, coarse, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

IIC—29 to 50 inches, yellowish-brown (10YR 5/4) and dark-brown (10YR 3/3) medium and coarse sand and fine gravel; single grained; medium acid.

The solum ranges from 24 to 40 inches in thickness. The A horizon is 10 to 20 inches thick and is loam or silt loam. The loamy B horizon is loam or silt loam and ranges from 10 to 30 inches in thickness. The IIB horizon, if present, ranges from sandy loam to loamy sand. The C horizon is medium and coarse sand and is 20 to 40 percent fine gravel. It is medium acid or slightly acid.

Saude soils are on terraces, as are Burkhardt and Waukee soils. They have less sand and a thicker solum than Burkhardt soils. They have appreciably more gravel in the lower part of the B horizon and in the C horizon than Waukee soils.

Saude loam (774).—This nearly level soil is in areas that are in no apparent pattern and are irregularly shaped. Most areas are less than 20 acres in size, but a few are more than 60 acres.

Included with this soil in mapping are several areas where some of the surface layer is missing. These areas are indicated on the soil map by a spot symbol.

32 inches thick. It is mainly black silty clay loam and has brownish mottles in the lower part. The subsoil is gray silty clay loam, has brownish and reddish mottles, and is 18 inches thick. The underlying material is dark-gray and gray silty clay loam that has olive and yellowish-brown mottles.

Sawmill soils are moderately to moderately slowly permeable and have very high available water capacity. They are better suited to crops tolerant of a seasonally high water table than to most others.

Representative profile of Sawmill silty clay loam, 400 feet west of Meredosia ditch spoil bank along east-west fence and 40 feet south in the northwest corner of SW¼SE¼SW¼ sec. 11, T. 20 N., R. 2 E.

Ap—0 to 9 inches, black (10YR 2/1) silty clay loam; strong, fine and medium, subangular blocky and angular blocky structure; firm; neutral; abrupt, smooth boundary.

A12—9 to 14 inches, black (10YR 2/1) silty clay loam; massive, dense plowsole; slightly acid; abrupt, smooth boundary.

A13—14 to 21 inches, black (10YR 2/1) silty clay loam; strong, medium, prismatic structure parting to moderate, medium, subangular and angular blocky; sticky; slightly acid; clear, smooth boundary.

A3—21 to 32 inches, very dark gray (10YR 3/1) silty clay loam; many, medium, prominent, dark-brown and brown (7.5YR 4/4), yellowish-brown (10YR 5/4), light yellowish-brown (10YR 6/4), and dark reddish-brown (5YR 3/4) mottles adjacent to root channels; strong, fine, prismatic structure; sticky; slightly acid; gradual, smooth boundary.

B2g—32 to 50 inches, gray (5Y 5/1) silty clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) and yellowish-red (5YR 4/6) mottles adjacent to root channels; large black (N 2/0) heavy silty clay loam krotovina at a depth of 32 to 42 inches; weak, coarse, subangular blocky structure; neutral; clear, smooth boundary.

Cg—50 to 60 inches, dark-gray (N 4/0) and gray (N 5/0) silty clay loam; common, medium, prominent, olive (5Y 5/3) and yellowish-brown (10YR 5/6) mottles; massive; recent channel fillings of black (N 2/0) surface material; neutral; clear, smooth boundary.

The solum ranges from 40 to 60 inches in thickness and from slightly acid to mildly alkaline. The silty clay loam A horizon ranges from 24 to 36 inches in thickness and from black to very dark gray. The gleyed B horizon is dominantly silty clay loam but ranges to clay loam and silt loam. It ranges from neutral to moderately alkaline.

Sawmill soils are on bottom lands, as are Radford and Otter soils. They have more clay in the A horizon than Radford or Otter soils. They have more clay throughout than the Otter soils.

Sawmill silty clay loam (107).—In most places this

These areas are indicated on the soil map by the symbol for escarpments. Also included are areas of less productive shale or sandstone. These areas are indicated on the soil map by the symbol for rock outcrop.

Frequently the water table is high. Flooding is a hazard on unprotected bottom lands. The high content of clay in the surface soil causes poor workability. The organic-matter content is high.

This soil is used mainly for cultivated crops, but is better suited to crops tolerant of a seasonally high water table than to most others. The degree of suitability for any use in areas subject to overflow depends on the frequency and duration of flooding. Capability unit IIw–2; woodland suitability group 2w5; wildlife group 6; recreation group 8.

Sawmill silty clay loam, wet (W107).—In most places this nearly level soil is in areas that lack natural drainage outlets. In some places it is in long and narrow sloughs. Areas are mostly circular or oblong in shape. Most are less than 20 acres in size, but some are more than 400 acres.

B21t—10 to 25 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; thin, continuous, dark-brown (10YR 4/3) clay films on faces of peds; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; friable; medium acid; clear, smooth boundary.

B22t—25 to 47 inches, dark yellowish-brown (10YR 4/4) silt loam; thin, discontinuous, dark-brown (10YR 4/3) clay films on faces of peds; moderate, medium, subangular blocky structure; friable; many white (10YR 8/1) when dry, uncoated silt grains; medium acid; clear, smooth boundary.

B3—47 to 55 inches, yellowish-brown (10YR 5/4) silt loam; thin, patchy, brown (10YR 5/3) clay films on faces of peds; few, fine, prominent, gray (5Y 6/1) mottles; moderate, coarse, prismatic structure; friable; medium acid; clear, smooth boundary.

C—55 to 65 inches, yellowish-brown (10YR 5/4) silt; few, fine, prominent, gray (5Y 6/1) mottles; massive; medium acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is silt loam and ranges from 5 to 12 inches in thickness in undisturbed areas. In some areas the A1 or Ap horizon is less than 6 inches thick and ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR

properly managed. The organic-matter content is low.

This soil is used mainly for cultivated crops. If properly managed, it is suited to all crops commonly grown in the county. Capability unit IIe–1; woodland suitability group 2o1; wildlife group 1; recreation group 1.

Seaton silt loam, 7 to 12 percent slopes, eroded (274D2).—In some places this soil is on sides or at the

size, but a few are more than 50 acres. The profiles of these soils are similar to the ones described as representative of the Seaton and Oakville series, but the surface layers are thinner and some subsoil material is mixed with them.

Included with these soils in mapping are severely eroded areas that are less than 1 acre in size and are

sentative of the Seaton and Oakville series, but the surface layers are thinner and some subsoil material is mixed with them.

Included with these soils in mapping are severely eroded areas that are less than 1 acre in size and are indicated on the soil map by a spot symbol. These areas are very low in content of organic matter. Included are unproductive areas of limestone bedrock that are indicated on the soil map by the symbol for rock outcrop. Also included are some areas where calcareous fine sand crops out. These areas require special fertilizer treatment and water management.

These soils are subject to severe erosion on unvegetated slopes. The organic-matter content is low.

These soils are used mainly for pasture or woodland. The steep slopes and erosion hazard, however, limit their suitability mainly to permanent plant cover. Capability unit VIIs–1; woodland suitability group 3r3; wildlife group 7; recreation group 4.

Seaton-Timula silt loams, 7 to 12 percent slopes, eroded (943D2).—In most places this mapping unit is on crowns of large dunes or occupies entire small dunes. It is about 70 percent Seaton silt loam and about 30 percent Timula silt loam. These soils are in a random pattern in the landscape. Commonly Seaton soils are on the sides of dunes, and Timula soils are on the crowns of dunes. Most areas are less than 15 acres in size, but a few are more than 50 acres. The Timula soil has the profile described as representative of the Timula series. The profile of the Seaton soil is similar to the one described as representative of the Seaton series, but the surface layer is thinner and some subsoil material is mixed with it.

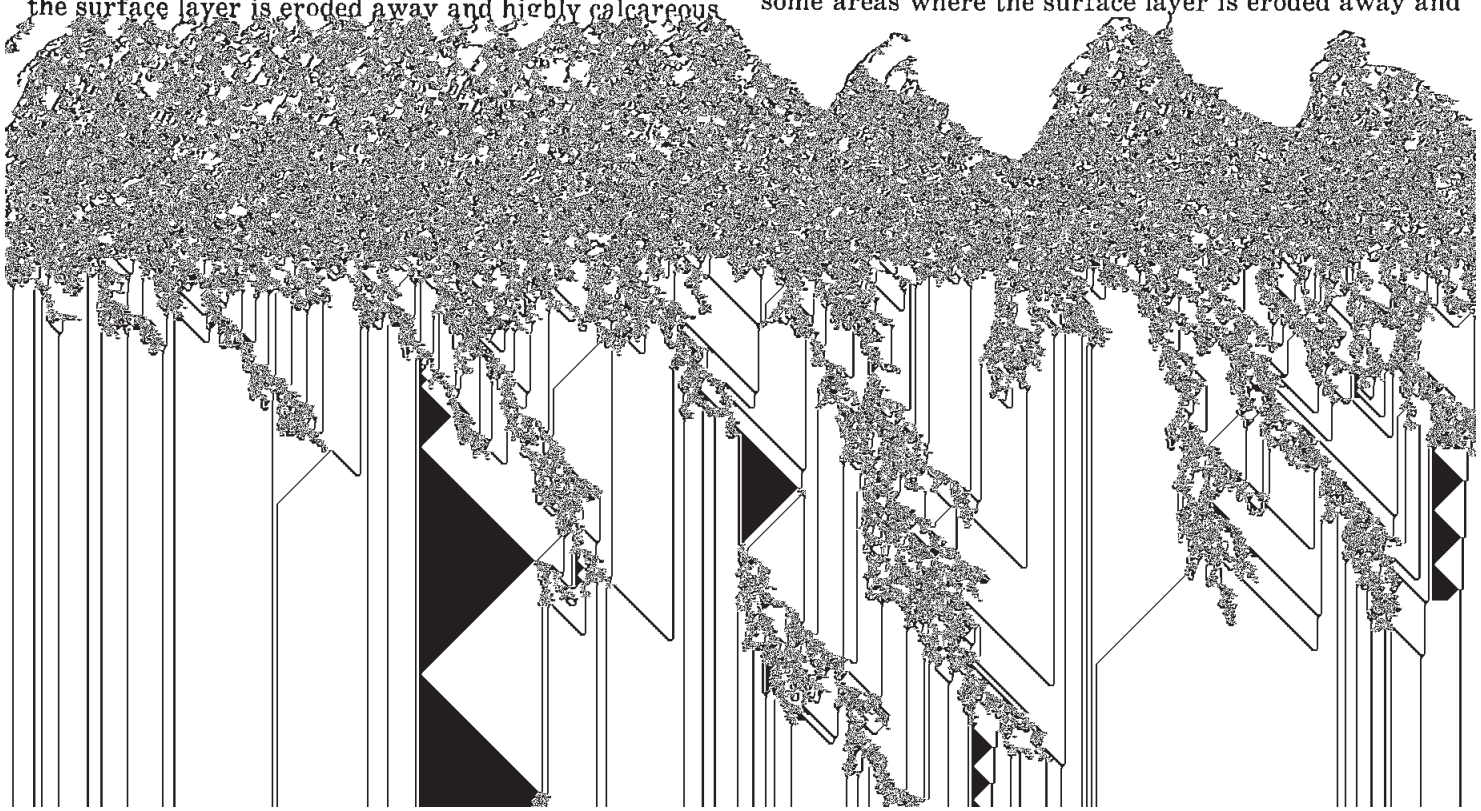
Included with these soils in mapping are areas where the surface layer is eroded away and highly calcareous, are very low in content of organic matter. Included are unproductive areas of limestone bedrock that are indicated on the soil map by the symbol for rock outcrop. Also included are areas where the surface layer is eroded away and highly calcareous, yellowish loess is exposed. It is difficult to establish vegetation and control erosion in these areas.

The hazard of erosion is severe if slopes are improperly managed. The organic-matter content is low.

These soils are used mainly for cultivated crops commonly grown in the county and for permanent pasture. The moderately steep slopes and severe hazard of erosion, however, limit their suitability mainly to grasses and legumes. Capability unit IVe–1; woodland suitability group 3r2; wildlife group 2; recreation group 4.

Seaton-Timula silt loams, 18 to 30 percent slopes, eroded (943F2).—In most places this mapping unit occupies entire dunes or is on the sides of some dunes. It is about 50 percent Seaton silt loam and about 50 percent Timula silt loam. These soils are in a random pattern in the landscape. Commonly Seaton soils occupy the lower part of the slope. In a few places, Seaton soils are on the sides of dunes, and Timula soils are on the crowns of dunes. Most areas are less than 15 acres in size, but a few are more than 100 acres. The profiles of these soils are similar to the ones described as representative of the Seaton and Timula series, but the surface layers are thinner and some subsoil material is mixed with them.

Included with these soils in mapping are severely eroded areas that are less than 1 acre in size and are indicated on the soil map by a spot symbol. These areas are very low in content of organic matter. Included are some areas where the surface layer is eroded away and



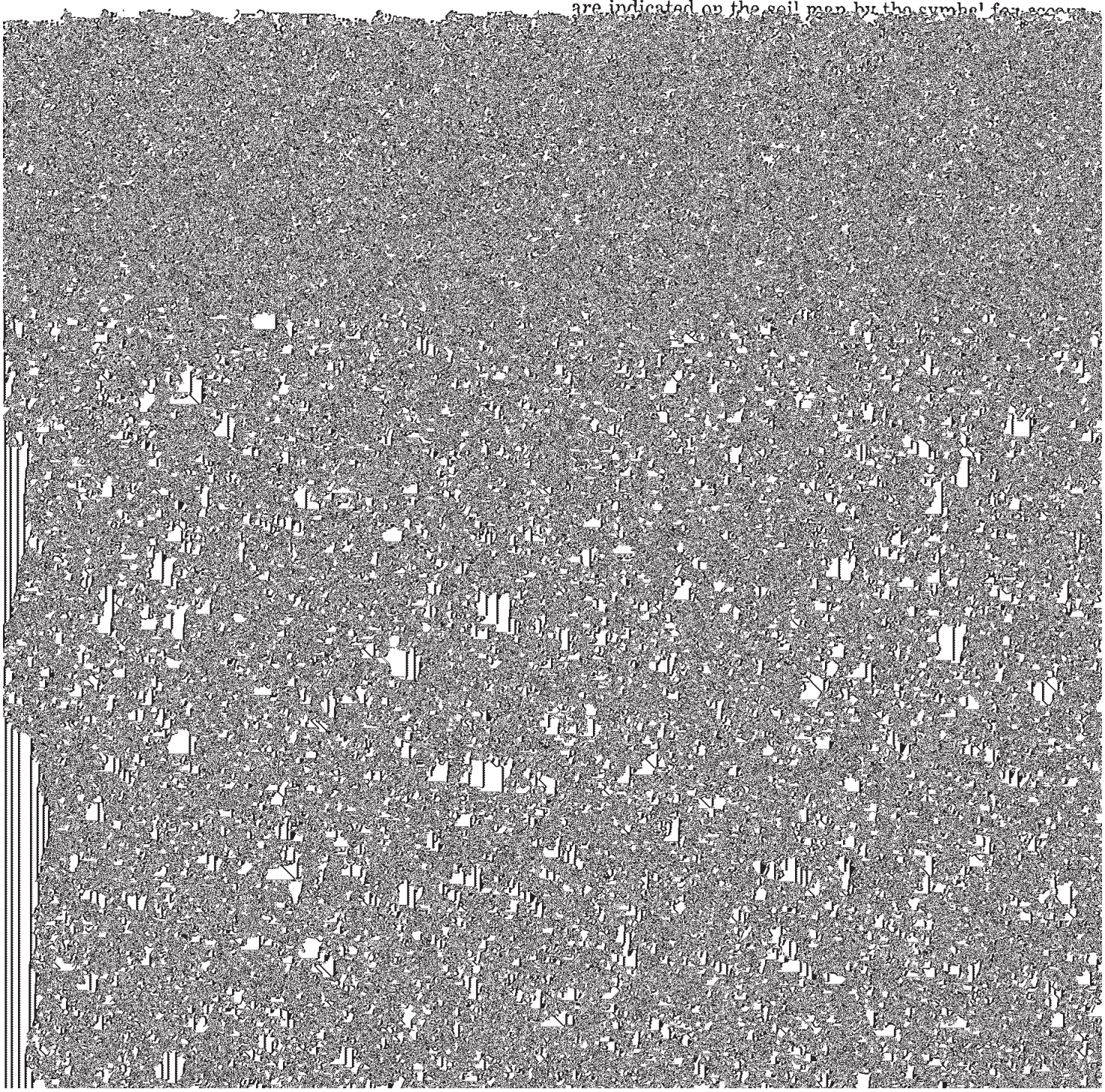
inches is strong-brown heavy sandy loam. The underlying material is brownish and yellowish fine sand.

These soils are moderately permeable and have high available water capacity. They are suited to the cultivated crops commonly grown if erosion is controlled. They are also suited to the commonly grown grasses and legumes.

Representative profile of Seaton silt loam, sandy substratum, 2 to 6 percent slopes, 335 feet east along fence from corner post and 135 feet south in the northeast corner of SW¼SW¼SW¼ sec. 8, T. 16 N., R. 5 W.

and tends to finger between and around the dunes. In a few areas it is on the crowns of dunes on the sides of small dunes. Areas are in no apparent pattern. Most are less than 10 acres in size, but a few are more than 40 acres.

Included with this soil in mapping are a few areas of less productive, poorly drained soils that are indicated on the soil map by the symbol for wet spots. Sand crops out in a few places, and these droughty areas are indicated on the soil map by a spot symbol. Some areas, about 1 acre in size, where slopes are short and narrow are indicated on the soil map by the symbol for eco-



Sparta soils are on terraces, as are Dickinson and Hoopeston soils. They are more sandy throughout the solum than Dickinson soils. They are better drained and have a sandier solum than Hoopeston soils.

Sparta sand, 0 to 6 percent slopes (88B).—In most places this soil is in broad areas. Areas are in the shape of the sand deposit and are oriented in the direction the sand was laid down. Some large areas in Cordova Township are more than 1,800 acres in size, but most are less than 80 acres.

Included with this soil in mapping are sandy soils that have a high content of gravel. In places wind has reworked the sand and underlying gravel and pebbles are in the profile, and in other places wind has removed most of the sand, and gravel is at a shallow depth. This underlying gravel is suitable for mining in most areas. Wind has caused severe erosion in some areas and blowouts have formed. Wi[illegible]

A2—6 to 12 inches, brown (10YR 4/3) and very dark grayish-brown (10YR 3/2) loam; moderate, fine and medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B2t—12 to 23 inches, dark yellowish-brown (10YR 4/4) light clay loam; thin, discontinuous, dark-brown (10YR 3/3) clay films on faces of peds; weak, medium and coarse, subangular blocky structure parting to moderate, fine and medium, subangular blocky; friable; neutral; gradual, smooth boundary.

C—23 to 50 inches, yellowish-brown (10YR 5/4) loam; massive; moderately alkaline; violently effervescent.

The solum ranges from 10 to 24 inches in thickness. In undisturbed areas the A horizon is loam or silt loam and is 4 to 12 inches thick. In most undisturbed areas the A1 horizon is less than 6 inches thick and ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2). The B horizon ranges from 6 to 20 inches in thickness.

Representative profile of Stronghurst silt loam, 160 feet south of road fence along east side of orchard lane and 47 feet east in the southwest corner of SW¼SW¼-NE¼ sec. 17, T. 18 N., R. 1 E.

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) and some brown (10YR 5/3) silt loam, light brownish gray (10YR 6/2) and pale brown (10YR 6/3) dry; moderate, thin, platy structure; friable; many light-gray (10YR 7/1) dry, uncoated silt grains; many iron-manganese concretions; many fine pores and root channels; neutral; abrupt, smooth boundary.

B1—10 to 14 inches, yellowish-brown (10YR 5/4) light silty clay loam; thin, discontinuous, dark grayish-brown (10YR 4/2) and brown to dark-brown (10YR 4/3) organic coatings on faces of peds; moderate, fine and medium, subangular blocky structure; friable; few dark grayish-brown (10YR 4/2) worm casts; many black (N 2/0) iron-manganese concretions; many, light-gray (10YR 7/1) dry, uncoated silt grains; many fine pores and root channels; neutral; clear, smooth boundary.

B21t—14 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; few, fine, distinct, brown to dark-brown (7.5YR 4/4) mottles; thin, continuous, dark grayish-brown (10YR 4/2) clay films on faces of peds; moderate to strong, fine and medium, subangular blocky and angular blocky structure; friable; few, light-gray (10YR 7/1) dry, uncoated silt grains; many black (N 2/0) iron-manganese concretions; many fine pores and root channels; slightly acid; clear, smooth boundary.

B22t—21 to 29 inches, pale-brown (10YR 6/3) silty clay loam; common, fine, prominent, brown to dark-brown (7.5YR 4/4), dark reddish-brown (5YR 3/4), yellowish-red (5YR 4/8), and yellowish-brown (10YR 5/6) mottles; thin, continuous, grayish-brown (10YR 5/2) and brown to dark-brown (7.5YR 4/2) clay films on faces of peds; strong, fine and medium, subangular blocky and angular blocky structure, slight tendency towards prismatic; firm; many black (N 2/0) iron-manganese concretions; some fine pores and root channels; medium acid; clear, smooth boundary.

B23t—29 to 40 inches, light olive-gray (5Y 6/2) and olive-gray (5Y 5/2) silty clay loam; many, fine and medium, prominent, strong-brown (7.5YR 5/6 and 7.5YR 5/8) mottles; thin, discontinuous, brown to dark-brown (7.5YR 4/2) and grayish-brown (10YR 5/2) coatings on faces of peds; moderate, medium, prismatic structure; firm; many black (N 2/0) iron-manganese concretions; few, fine pores; strongly acid; clear, smooth boundary.

B3t—40 to 51 inches, mixed olive-gray (5Y 5/2) and light olive-gray (5Y 6/2) light silty clay loam; many, fine and medium, prominent, strong-brown (7.5YR 5/6 and 7.5YR 5/8) mottles; thin, discontinuous, brown to dark-brown (7.5 YR 4/2) and grayish-brown (10YR 5/2) coatings on faces of peds; weak, coarse, prismatic structure; firm; many black (N 2/0) iron-manganese concretions; few fine pores; slightly acid; clear, smooth boundary.

C—51 to 60 inches, olive-gray (5Y 5/2) silt loam; common, fine and medium, prominent, strong-brown (7.5YR 5/6 and 7.5YR 5/8) mottles; massive; many iron-manganese concretions; fine pores and root channels; slightly acid.

The solum ranges from 48 to 60 inches in thickness. The silt loam Ap horizon ranges from 6 to 10 inches in thick-

ette soils. They have a lighter colored or a thinner dark-colored A horizon than Atterberry soils.

Stronghurst silt loam (278).—In most places this nearly level soil is on ridgetops, mainly away from drainageways toward the center of ridgetops. Areas are irregularly shaped. Most are less than 10 acres in size, but a few are more than 100 acres.

Included with this soil in mapping are a few areas at the heads of drainageways where slopes are 3 to 5 percent. These soils are eroded in most places and need stabilizing. Some poorly drained soils similar to Stronghurst soils are included. These soils remain wet for longer periods after rain than Stronghurst soils and need artificial drainage. Other poorly drained, less productive soils that are about 1 acre in size are indicated on the soil map by a spot symbol. Also included are some areas of Stronghurst soils in or near metropolitan areas where the surface layer is missing. Interpretations for these areas are based mainly on subsoil characteristics.

Occasionally the water table is high in this soil. The organic-matter content is moderately low.

This soil is used mainly for cultivated crops, but it is suited to all crops commonly grown in the county. In places this soil is used for urban development, but it is not well suited to this use. Capability unit IIw–1; woodland suitability group 3o1; wildlife group 4; recreation group 5.

Sylvan Series

The Sylvan series consists of strongly sloping to very steep, well-drained soils on uplands. These soils formed in deep loess under native timber vegetation.

In a representative profile the surface layer is very dark grayish-brown silt loam about 6 inches thick. The subsoil is about 24 inches thick. The upper 9 inches of it is dark yellowish-brown silty clay loam, and the lower 15 inches is yellowish-brown silt loam. The underlying material is yellowish-brown silt loam that is moderately alkaline.

Sylvan soils are moderately permeable and have high available water capacity. The high content of natural lime in the underlying material decreases the amount of available phosphate and potash. These soils are suited to the cultivated crops commonly grown if erosion is controlled. They are well suited to the commonly grown grasses and legumes.

Representative profile of Sylvan silt loam, 18 to 30 percent slopes, 177 feet north of corner of east-west fence and northeast-southwest fence in the northwest corner of SW¼NW¼SE¼ sec. 29, T. 17 N., R. 2 W.

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular blocky and blocky structure parting to moderate, thin and medium, platy; friable; neutral; clear, smooth boundary.

B2t—6 to 15 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; thin, discontinuous, brown and

subangular blocky structure; friable; mildly alkaline; clear, smooth boundary.

C—30 to 60 inches, yellowish-brown (10YR 5/4) silt loam; common, fine, prominent, light-gray (10YR 7/1) lime concretions; massive; moderately alkaline; strongly effervescent.

The solum ranges from 20 to 40 inches in thickness. In undisturbed areas the A horizon is silt loam and ranges from 5 to 12 inches in thickness. In some undisturbed areas the A1 horizon is less than 6 inches thick and ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2). The B horizon is 20 to 25 inches thick. The B2t horizon is light silty clay loam or medium silty clay loam. The B3 horizon ranges from light silty clay loam to silt loam. The silt loam C horizon is mildly alkaline or moderately alkaline.

Sylvan soils formed in thick loess, as did Fayette and Elkhart soils. Their solum is thinner than that of Fayette soils. They have a thinner A horizon than Elkhart soils.

Sylvan silt loam, 12 to 18 percent slopes (19E).—In most places this soil is on sides or at upper ends of valleys between less sloping ridgetops and nearly level bottom lands or drainageways. In a few places it occupies the upper part of the slope above soils formed in till or shale. Most areas are less than 5 acres in size, but a few are more than 18 acres.

Included with this soil in mapping are a few areas of Fayette soils and soils similar to Sylvan soils that are not calcareous at a depth above 40 inches, both of which are more productive. Included are some areas of eroded Sylvan and Fayette soils where part of the surface layer is missing and tilth is poorer. Some less productive, severely eroded areas are indicated on the soil map by a spot symbol. Also included are a few areas of very poorly drained soils that are indicated on the soil map by the symbol for wet spots.

This soil is subject to erosion if slopes are improperly managed. The organic-matter content is moderately low.

This soil is used mainly for permanent pasture or timber and is well suited to these uses. Capability unit IVe–1; woodland suitability group 2r2; wildlife group 2; recreation group 4.

Sylvan silt loam, 18 to 30 percent slopes (19F).—In most places this soil is on sides or at upper ends of valleys, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. Most areas are less than 5 acres in size, but a few are more than 16 acres. This soil has the profile described as representative of the Sylvan series.

Included with this soil in mapping are a few areas of soils similar to Sylvan soils that are more productive and are not calcareous at a depth above 40 inches and areas of soils similar to Sylvan soils that are less productive and are sandy throughout the profile. Less productive sandy areas that are about 1 acre in size are indicated on the soil map by a spot symbol. Also included

Sylvan soils, 7 to 12 percent slopes, severely eroded (19D3).—In most places this mapping unit is on short sides or at upper ends of valleys below less sloping ridgetops. In a few places it occupies the upper part of the slope above soils formed in till or shale. Most areas are less than 10 acres in size, but a few are more than 25 acres. These soils have profiles similar to the one described as representative of the series, but the surface layer is mainly the dark yellowish-brown silty clay loam subsoil.

Included with these soils in mapping are a few areas of less productive soils where calcareous loess crops out on slopes. Included are some areas of soils similar to Sylvan soils that are more productive and are not calcareous at a depth above 40 inches. Also included are minor areas of less eroded Sylvan soils where less of the surface layer is missing and tilth is better than in severely eroded Sylvan soils.

These soils are subject to further erosion if slopes are improperly managed. Runoff is rapid, and infiltration is slow. Most of the original surface layer is eroded away, tilth is poor, and organic-matter content is very low.

These soils are or have been used mainly for cultivated crops and pasture. The severe erosion, however, limits suitability mainly to grasses and legumes or trees. Capability unit IVe–1; woodland suitability group 2o1; wildlife group 1; recreation group 3.

Sylvan soils, 12 to 18 percent slopes, severely eroded (19E3).—In most places this mapping unit is on short sides or at upper ends of valleys between less sloping ridgetops and nearly level bottom lands or drainageways. In a few places it occupies the upper part of the slope above soils formed in till or shale. Areas are mostly less than 5 acres in size, but a few are more than 18 acres. The profiles of these soils are similar to the one described as representative of the series, but the surface layer is mainly the dark yellowish-brown silty clay loam subsoil.

Included with these soils in mapping are a few areas of less productive soils where calcareous loess crops out. Included are small areas of less productive Atlas soils. Also included are areas of Fayette soils and soils similar to Sylvan soils that are not calcareous at a depth above 40 inches, both of which are more productive.

These soils are subject to further erosion if slopes are improperly managed. Runoff is rapid, and infiltration is slow. Most of the original surface layer is eroded away, tilth is poorer, and organic-matter content is very low.

These soils are or have been used mainly for cultivated crops and pasture. The moderately steep slopes and severe erosion, however, limit their suitability

soils are similar to the one described as representative of the series, but the surface layer is mainly the dark yellowish-brown silty clay loam subsoil.

Included with these soils in mapping are a few areas of less productive soils where calcareous loess crops out. Included are a few small areas of less productive Atlas soils. Also included are areas of more productive soils that are similar to Sylvan soils and not calcareous at a depth above 40 inches.

These soils are subject to further erosion if slopes are improperly managed. Runoff is rapid, and infiltration is slow. Most of the original surface layer is eroded away, tilth is poorer and organic-matter content is very low.

These soils are or have been used mainly for cultivated crops and pasture. The steep slopes and severe erosion, however, limit their suitability mainly to grasses and legumes or trees. Capability unit VIe–1; woodland suitability group 2r2; wildlife group 3; recreation group 4.

Sylvan-Bold silt loams, 18 to 60 percent slopes (962F).—In most places this mapping unit is on sides or at upper ends of valleys, commonly between less sloping ridgetops and nearly level bottom lands or drainageways. It is about 70 percent Sylvan silt loam and about 30 percent Bold silt loam. On most slopes Sylvan soils are below Bold soils. Commonly, Sylvan soils occupy 75 to 95 percent of slopes adjacent to small tributaries, but Bold soils occupy as much as 75 percent of slopes that face larger stream valleys. Most areas are less than 10 acres in size, but a few are more than 35 acres. The Bold soil has the profile described as representative of the Bold series. The Sylvan soil has a profile similar to the one described as representative of the Sylvan series, but the subsoil is thinner.

Included with these soils in mapping are a few areas of more productive Fayette soils. In some areas the surface layer has been removed by erosion and highly calcareous yellowish loess is exposed. These areas are indicated on the soil map by a spot symbol. It is difficult to establish vegetation and control erosion in these eroded areas.

These soils are subject to severe erosion if slopes are improperly managed. The organic-matter content is moderately low to low.

These soils are used mainly for permanent pasture and timber and are better suited to this use than to most others. Capability unit VIe–1; woodland suitability group 2r2; wildlife group 3; recreation group 4.

Tama Series

The Tama series consists of well-drained, nearly level to strongly sloping soils on uplands. These soils formed in deep loess under natural grass vegetation.

In a representative profile the surface layer is mainly black silt loam about 20 inches thick. The subsoil is silty clay loam about 38 inches thick. The upper 20 inches of it is brown to dark brown, and the lower 18 inches is dark grayish brown and grayish brown and is mottled with yellowish brown. The underlying material is light brownish-gray light silty clay loam.

Tama soils are moderately permeable and have very high available water capacity. They are suited to the cultivated crops commonly grown if erosion is controlled. They are well suited to the commonly grown grasses and legumes.

Representative profile of Tama silt loam, 0 to 2 percent slopes, 600 feet east of tall concrete stave silo on ridgetop apex approximately 600 feet wide in the southwest corner of SE¼SW¼NW¼ sec. 24, T. 16 N., R. 3 W.

Ap—0 to 9 inches, black (10YR 2/1) heavy silt loam; weak, medium, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

A12—9 to 15 inches, black (10YR 2/1) and very dark brown (10YR 2/2) light silty clay loam; moderate, medium, angular blocky structure; friable; compacted; many roots; slightly acid; abrupt, smooth boundary because of compaction.

A3—15 to 20 inches, very dark gray (10YR 3/1) light silty clay loam; moderate, medium, granular structure; friable; many roots; slightly acid; clear, smooth boundary.

B21t—20 to 25 inches, brown to dark-brown (10YR 4/3) medium silty clay loam; weak, medium, subangular blocky structure parting to weak, fine, subangular blocky; friable; some very dark gray (10YR 3/1) along root channels; common roots; medium acid; clear, smooth boundary.

B22t—25 to 31 inches, brown (10YR 4/3) medium silty clay loam; moderate, medium, prismatic structure parting to moderate and strong, fine, subangular blocky; firm; brown and dark-brown (10YR 4/3) clay films on faces of peds; common roots; strongly acid; clear, smooth boundary.

B23t—31 to 40 inches, brown to dark-brown (10YR 4/3) medium silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/4 to 5/6) mottles; weak, medium, prismatic structure parting to moderate and strong, medium, subangular blocky; firm; grainy grayish-brown (10YR 5/2) coatings and continuous brown to dark-brown (10YR 4/3) to dark grayish-brown (10YR 4/2) clay films on faces of peds; common roots; strongly acid; clear, smooth boundary.

B24t—40 to 46 inches, dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) light silty clay loam; many, fine, distinct, yellowish-brown (10YR 5/4 to 5/6) mottles; weak, coarse, angular blocky structure parting to weak and moderate, medium, angular blocky; firm; brown to dark grayish-brown (10YR 4/3 to 4/2) clay films continuous on vertical faces of peds and discontinuous on horizontal faces; few roots; strongly acid; clear, smooth boundary.

B3—46 to 58 inches, grayish-brown (10YR 5/2) light silty clay loam; many, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; discontinuous brown and dark-brown (10YR 4/3) to dark grayish-brown (10YR 4/2) clay films on faces of peds; few roots; medium acid; clear, smooth boundary.

C—58 to 60 inches, light brownish-gray (10YR 6/2) light silty clay loam; massive; friable; common concretions; medium acid; gradual, smooth boundary.

The solum ranges from 40 to 60 inches in thickness. The A horizon ranges from 10 to 20 inches in thickness. It is silt loam and light silty clay loam. The silty clay loam B horizon ranges from 30 to 40 inches in thickness. The light silty clay loam C horizon ranges from medium acid to moderately alkaline.

Mapping units 36C2 and 36D2 are outside the range defined for the series because their surface layer is less than 10 inches thick and the B horizon is mottled and grayish at a depth above 40 inches. These differences do

not significantly alter the use and management of the soils.

Tama soils are in a soil pattern with Muscatine and Elkhart soils. They are better drained than Muscatine soils. Their solum is thicker than that of Elkhart soils.

Tama silt loam, 0 to 2 percent slopes (36A).—In most places this soil is on ridgetops and low knolls, and it tends to finger between more sloping drainageways. Areas are irregularly shaped. Most are less than 10 acres in size, but a few are more than 30 acres. This

ends of valleys below less sloping ridgetops. Most areas are less than 10 acres in size, but a few are more than 50 acres. The profile of this soil is similar to the one described as representative of the series, but in most places the dark-colored surface layer is about 10 to 14 inches thinner and brownish silty clay loam subsoil material is mixed with it.

Included with this soil in mapping are severely eroded areas that are less than 1 acre in size and are

B21—10 to 17 inches, dark yellowish-brown (10YR 4/4) silt loam, light yellowish-brown (10YR 6/4) dry; weak, fine, subangular blocky structure; uncoated silt grains on faces of peds; friable; medium acid; clear, smooth boundary.

B22t—17 to 25 inches, dark yellowish-brown (10YR 4/4)

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) and yellowish-brown (10YR 5/4) silt loam; compact in place parting to moderate, very fine and fine, granular structure; friable; neutral; abrupt, smooth boundary.

B2—7 to 16 inches, yellowish-brown (10YR 5/6) silt loam;

IIC—34 to 60 inches, brown and dark-brown (10YR 4/3), brown (10YR 5/3), and dark reddish-brown (5YR 3/4) medium and coarse sand and fine gravel; single grained; medium acid.

The solum ranges from 20 to 40 inches in thickness. The A horizon is 10 to 20 inches thick and ranges from silt loam to loam. The reddish loamy upper part of the B horizon ranges from heavy loam to sandy clay loam and is 10 to 30 inches thick. In places a reddish IIB horizon ranges

few sand grains and pebbles; strongly acid; clear, smooth boundary.

IIB21t—17 to 22 inches, yellowish-brown (10YR 5/4) light clay loam; moderate, medium and coarse, subangular blocky structure; friable; some dark-brown (10YR 4/3) worm casts, root channel fillings, and discontinuous clay films on faces of peds; few glacial pebbles; strongly acid; clear, smooth boundary.

ever, limit its suitability mainly to grasses and legumes or trees. Capability unit IVe–1; woodland suitability group 1r2; wildlife group 2; recreation group 4.

Velma-Coatsburg silt loams, 12 to 18 percent slopes, eroded (944E2).—In most places this mapping unit is on valley sides, commonly between the less sloping ridgetops and the bottom land or drainageways. It is about 60 percent Velma silt loam and 40 percent Coatsburg silt loam. Velma soils commonly occupy the lower and middle parts of the slope, and Coatsburg soils the upper part. Areas are less than 10 acres in size. The Coatsburg soil has a profile similar to the one described as representative of the Coatsburg series. The Velma soil has the profile described as representative of the series, but in most places the dark-colored surface layer is thinner and is mixed with some of the subsoil.

Included with these soils in mapping are a few areas of soils, on the upper parts of slopes, that have 20 to 40 inches of loess over fine-textured material and a few areas near the heads of valleys and on opposite slopes of silty Elkhart soils. In places are areas of eroded Hickory and Atlas soils, which have less organic matter in the surface layer than the eroded Velma and Coats-

A12—6 to 15 inches, black (N 2/0) silty clay; moderate, medium and coarse, subangular blocky and angular blocky structure; firm; neutral; clear, smooth boundary.

B2g—15 to 32 inches, black (N 2/0) light clay; olive (5Y 4/4) root linings in lower part; moderate, medium, prismatic structure parting to moderate, coarse, subangular blocky; firm; neutral; clear, smooth boundary.

B3g—32 to 40 inches, mixed black (N 2/0) and dark-gray (5Y 4/1) light clay; many, fine, distinct, olive (5Y 4/4) mottles and many, fine, prominent, brownish-yellow (10YR 6/8) mottles; common, fine, prominent, white (10YR 8/1) mottles lining root channels; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; firm; neutral; abrupt, smooth boundary.

Cg—40 to 63 inches, dark-gray (10YR 4/1), olive-brown (2.5Y 4/4), olive-gray (5Y 5/2), and olive (5Y 5/3) clay loam; many, fine, faint, olive (5Y 4/4) mottles, many, fine, distinct, brownish-yellow (10YR 6/8) mottles and common, fine, distinct, white (10YR 8/1) mottles lining root channels; massive tending to weak, coarse, subangular blocky structure in upper half of horizon; firm; snail shells abundant in upper half of horizon and a few in lower part; moderately alkaline; strongly effervescent.

mainly dark yellowish-brown loam, and the lower 4 inches is dark yellowish-brown fine sandy loam. The underlying material is brown and yellowish-brown loamy fine sand.

Waukee soils are moderately permeable and have moderate available water capacity. They are somewhat droughty.

These soils are suited to all crops commonly grown in the county, but they are better suited to drought-resistant crops than to most others.

Representative profile of Waukee loam, 0 to 4 percent slopes, 220 feet east along east-west fence from corner of fence that extends south and 397 feet north of east-west fence in the northwest corner of SE¼-SE¼NW¼ sec. 3, T. 20 N., R. 2 E.

Ap—0 to 10 inches, very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; massive parting to moderate, very fine to medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A3—10 to 18 inches, very dark grayish-brown (10YR 3/2) and very dark gray (10YR 3/1) heavy loam; weak, coarse, subangular blocky structure parting to moderate, very fine to medium, granular; friable; medium acid; clear, smooth boundary.

B21—18 to 26 inches, brown (10YR 4/3) loam; continuous, very dark grayish-brown (10YR 3/2) organic coatings on faces of peds; moderate, medium and coarse, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B22—26 to 33 inches, dark yellowish-brown (10YR 4/4) loam; continuous, dark-brown (10YR 3/3) organic coatings on faces of peds; moderate, medium and coarse, subangular blocky structure; friable; medium acid; clear, smooth boundary.

IIB3—33 to 37 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; discontinuous, dark-brown (10YR 3/3) organic coatings on faces of peds; weak, medium and coarse, subangular blocky structure; very friable; medium acid; abrupt, smooth boundary.

IIC—37 to 60 inches, brown (10YR 4/3) and yellowish-brown (10YR 5/4) loamy fine sand that is massive in place; medium acid.

The solum ranges from 24 to 40 inches in thickness. The A horizon is 10 to 20 inches thick and is loam or silt loam. The loamy upper part of the B horizon is silt loam or loam and 10 to 30 inches thick. In places, a IIB horizon ranges from sandy loam to loamy sand. The IIC horizon ranges from loamy fine sand to sand and fine gravel.

Waukee soils are on terraces, as are Dickinson and Lawler soils. They have less sand in the solum than Dickinson soils. They are better drained than Lawler soils.

Waukee loam, 0 to 4 percent slopes (727A).—This soil is in areas that are in no apparent pattern and are irregularly shaped. Most areas are less than 10 acres in size, but a few are more than 120 acres.

Included with this soil in mapping are small areas of Dickinson soils that are [illegible]

Use and Management of the Soils

This section explains the capability classification used by the Soil Conservation Service. It shows the suitability of the soils for crops and predicts yields for the principal crops under a high level of management. It describes the woodland and the kinds of wildlife in the county. It also evaluates the suitability of the soils for recreational facilities and for highways and other engineering structures.

General Management of Crops and Pasture

About 50 percent of Rock Island County is cultivated. Corn and soybeans are the principal crops. Small grain and forage are also grown.

The main management concerns for cultivated soils in the county are controlling erosion, overcoming the hazard of wetness, protecting from flooding, conserving moisture, and maintaining tilth and fertility.

Measures that help to control erosion are terracing, contour farming, conservation tillage, cover crops, grassed waterways, and use of crop residue. Generally, combinations of several measures are used. Measures that help to overcome wetness are the use of tile drains, shallow surface ditches, inlets to tile drains, drainage ditches, and diversions. Levees protect the soils from flooding. Conserving moisture generally means reducing evaporation, limiting runoff, increasing infiltration, and controlling weeds. Practices that help to conserve moisture are conservation tillage, use of crop residue, contour farming, stripcropping, and use of field windbreaks. Applying chemical fertilizer, green manure, and barnyard manure and including cover crops, grasses, and legumes in the cropping system help to maintain tilth and fertility. Controlling erosion also helps to conserve fertility and maintain tilth. Crops respond well to fertilizer. Lime is needed periodically, especially on most uplands and terraces.

Good management is very important for rotational and permanent pasture. Renovation of pasture land, by applying lime and fertilizer according to the results of soil tests, controlling erosion, preparing a good seedbed, using a combination of adapted legumes and grasses for seeding, controlling weeds, and controlling erosion, is the key to obtaining profitable grazing land.

The soils in capability classes I, II, III, and IV are generally not used for permanent pasture but are used for field crops and rotational pasture. When those soils are used for permanent pasture, and when the pasture is renovated and well managed, good yields generally are obtained.

If renovation is practical, the soils in capability

soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change

climate that is too cold or too dry. Only subclasses *e*, *w*, and *s* are in Rock Island County.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain

These soils have no major limitations. Maintaining fertility and tilth is the main management need. Tile drains reduce wetness in some areas.

The soils in this unit are intensively cultivated in most places. Corn and soybeans are the main crops, and the soils are well suited to them. Small grain and forage are also grown.

CAPABILITY UNIT I-3

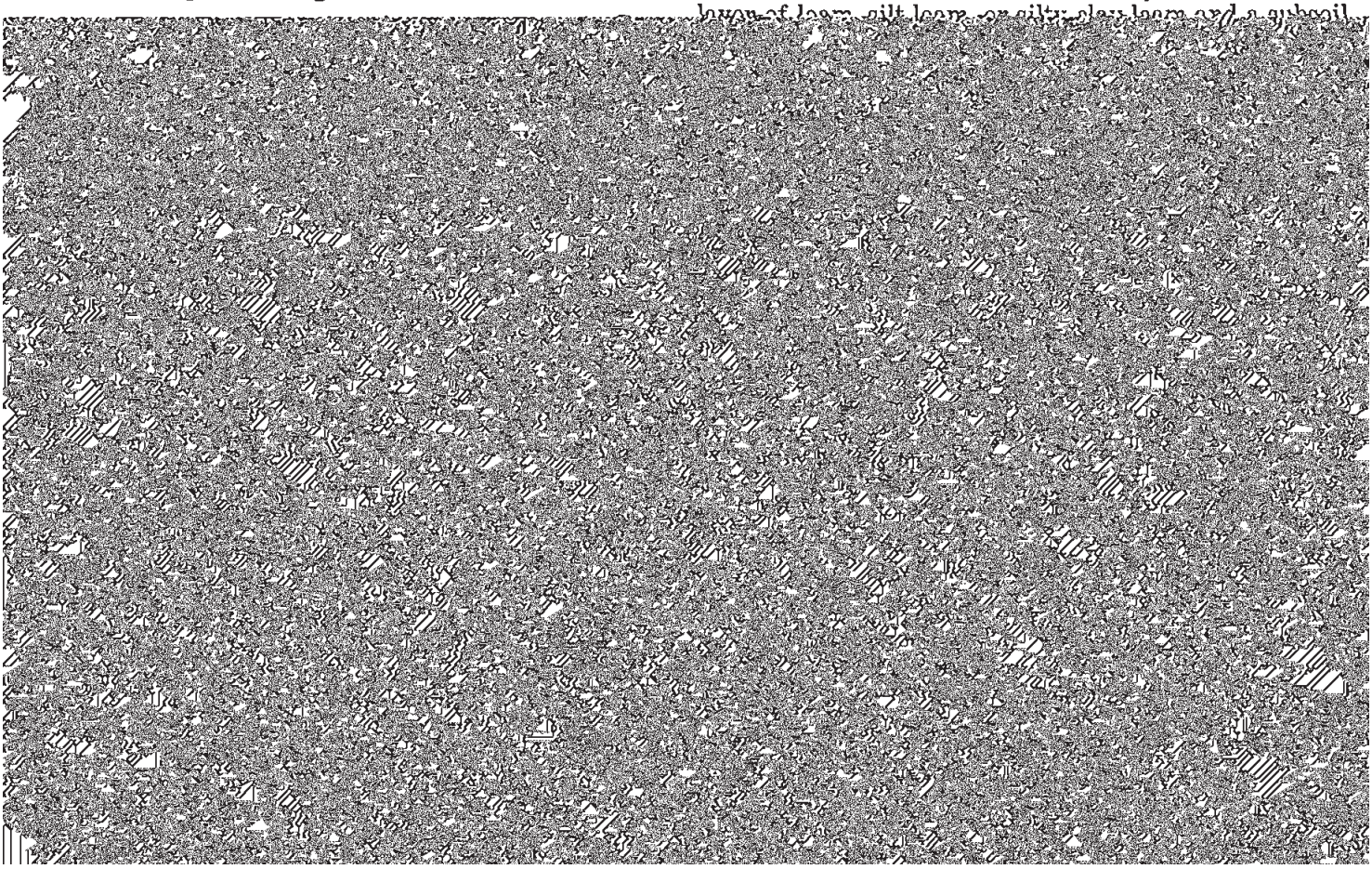
This unit consists of nearly level soils of the Coffeen, Dorchester, Lawson, Orion, and Radford series. These soils are on bottom lands. The Dorchester soil is moderately well drained, and the rest are somewhat poorly drained. All have a surface layer of silt loam and a subsoil or subsurface layer of silt loam or silty clay loam. Permeability is moderate, and available water capacity is very high. The organic-matter content is high to moderately low.

These soils have no major limitations. Maintaining fertility and tilth is the main management need. Soils not protected by levees are subject to seasonal flooding. Randomly placed tile drains and shallow surface ditches reduce wetness in some areas. Dorchester soils are naturally high in lime, which reduces the availability of phosphorus and most minor nutrients. Annual application of superphosphate on high lime soils is more readily available to crops than bulk additions.

The soils in this unit are used mainly for corn and soybeans, and they are well suited to this use. Small grain and forage are also grown.

CAPABILITY UNIT IIw-2

This unit consists of nearly level, poorly drained soils of the Calco, Millington, Otter, and Sawmill series. These soils are on bottom lands. They have a surface layer of loam, silt loam, or silty clay loam and a subsoil



are on terraces, and the rest are on uplands. The surface layer is silty clay loam in the Sable soil and silt loam in the rest. The subsoil is silt loam in the Canisteo soil and silty clay loam in the rest. Permeability is moderate in Canisteo and Sable soils; moderate to moderately slow in the Stronghurst soil; and slow in the Denny soil. Available water capacity is high to very high. The organic-matter content is moderately low in the Stronghurst soil, moderate in Canisteo and Denny soils, and high in the Sable soil.

Wetness is the main hazard. The water table is seasonally high. Ponding and slow runoff are limitations in some areas of uplands. Shallow surface ditches and tile drains reduce wetness. The Sable soil is difficult to work, but the rest have good tilth. Fall plowing is a common practice, but soil blowing is a hazard when the surface soil dries out the following spring. The Canisteo soil is high in lime, which reduces the availability of phosphorus and most minor nutrients. Annual application of superphosphate on high lime soils is more readily available to crops than bulk additions.

The soils in this unit are used mainly for corn and soybeans, and they are well suited to this use. Small grain and forage are also grown.

This soil is somewhat droughty. The main limitations are the solid bedrock at a depth of 20 to 40 inches and moderate available water capacity.

This soil is best suited to drought-resistant crops. Corn and soybeans are the main crops. Small grain and forage are also grown.

CAPABILITY UNIT IIs-2

This unit consists of nearly level to gently sloping, well-drained soils of the Coyne, Saude, Trempealeau, and Waukee series. These soils are on stream terraces. They have a surface layer of fine sandy loam, loam, or silt loam. The subsoil is silty clay loam in the Coyne soil and loam in the rest. Permeability is moderate to moderately rapid, and available water capacity is moderate. The organic-matter content is moderate.

These soils are somewhat droughty. The main limitation is the moderate available water capacity. The hazard of soil blowing is a limitation on the Coyne soil. Water erosion is a slight hazard in gently sloping areas.

These soils are best suited to such drought-resistant crops as rye and oats. Corn and soybeans can be grown, but yields are moderate.

CAPABILITY UNIT IIs-3

This unit consists of nearly level, somewhat poorly drained soils of the Hoopeston and Lawler series. These soils are on terraces. The Hoopeston soil has a surface layer and subsoil of sandy loam, and the Lawler soil has a surface layer of loam and subsoil of sandy clay loam. Permeability is moderate to moderately rapid, and available water capacity is moderate to low. The organic-matter content is moderate.

The main limitations are the low to moderate available water capacity and the hazard of soil blowing. These soils are somewhat droughty and have a seasonally high water table. Because they are porous, they do not hold large amounts of plant nutrients. Fertilizer should be applied frequently and in small amounts to reduce the loss through leaching.

These soils are best suited to such drought-resistant crops as rye and oats. Corn and soybeans can be grown, but yields are moderate.

CAPABILITY UNIT IIIe-1

This unit consists of strongly sloping, well-drained, eroded soils of the Elkhart, Fayette, Seaton, Tama, and Timula series. These soils are on uplands. They have a surface layer of silt loam and a subsoil of silt loam or silty clay loam. Permeability is moderate, and available water capacity is high to very high. The organic-matter content is moderate to low.

Water erosion is the main hazard in cultivated areas (fig. 6). Maintaining or improving fertility and tilth is necessary on eroded soils.

The soils in this unit are suited to crops grown in the county, but are not well suited to continuous row crops. Corn, soybeans, small grain, and forage are the main crops.

Figure 6.—**A strongly sloping, eroded Fayette silt loam. Contour farming with alternating strips of row crops and grass and legumes is effective in erosion control.**

CAPABILITY UNIT IIIc-2

subject to frequent overflow from adjacent sandy and

The main limitations are the very low available water capacity and the low natural fertility. Soil blowing is a major hazard in unprotected areas. Because these soils are porous, they do not hold large amounts of plant nutrients. Fertilizer should be applied frequently and in small amounts to reduce the loss through leaching.

Most of the acreage is in pasture or native cover. Unless irrigated, the soils are poorly suited to cultivated crops commonly grown in the county.

CAPABILITY UNIT Vw

This unit consists of nearly level, poorly drained to very poorly drained soils of the Calco, Millington, Otter, and Sawmill series. These soils are on bottom lands and are wet for long periods. They have a surface layer of silt loam, loam, or silty clay loam and a subsoil of silt loam or silty clay loam. Permeability is moderate

gree of suitability for pasture and woodland depends on the frequency and duration of ponding.

CAPABILITY UNIT VIe-1

This unit consists of moderately steep to steep, moderately well drained to well drained soils of the Bold, Fayette, Hickory, Martinsville, Seaton, Sylvan, and Timula series. These soils are on uplands. They have a surface layer of silt loam, loam, silty clay loam, or clay loam and a subsoil of silty clay loam, silt loam, or clay loam. Permeability is moderate, and available water capacity is moderate to very high. The organic-matter content is moderately low to very low. Many areas of these soils are severely eroded.

The main limitations are the moderately steep to steep slopes and the severe hazard of water erosion (fig. 7). Water runoff is rapid, especially in areas of eroded soils that have poor vegetation.

The soils in this unit are unsuitable for cultivation

drained to well-drained soils of the Coatsburg, Hickory, ... able water capacity is very high in the Seaton soil and

off is rapid to very rapid during periods of heavy rainfall. The Chute soil is subject to soil blowing in bare areas. The soils seldom have a reserve supply of moisture.

The soils in this unit are unsuitable for cultivation and are poorly suited to pasture. Excessive grazing on pasture destroys the protective cover and results in excessive erosion. Most of the acreage is in woodland. Generally, the soils are too steep for machinery to be used for liming, fertilizing, seeding, or mowing. They are suited to woodland and wildlife.

(for the period 1954 to 1963), on soil tests, and on the experience and records of farmers, agronomists, conservationists, and farm advisors (*12*). The predictions are adjusted to reflect the trend toward higher yields during the period 1963 to 1972. Average yields are expected to increase. A few farmers obtain yields as high as 200 bushels of corn per acre in some years, but yields this high are still uncommon.

Management was determined on the basis of farming techniques, crop varieties, and fertilizers commonly

Each woodland group is identified by a symbol, for example 2o1. The first element of the symbol is a number that indicates productivity by site class. The site class is based on the site quality, or site index, of one or more of the indicator tree species. Class 1 soils have the highest potential productivity.

The second element in the symbol is a letter that indicates the suitability subclass. It is based on important soil or physiographic characteristics. The letter *w* denotes excessive water, *s* denotes sandy texture and low available water capacity, *r* denotes steep slope, and *o* denotes no significant limitations or restrictions for woodland use.

The third element of the symbol is a numeral that designates specified soils, within a subclass, that require similar management and that have about the same potential productivity. The numeral 1 indicates upland and terrace soils for which all limitations to special harvesting methods necessary, or that use of equipment is restricted because the soils are wet for more than 3 months each year.

Seedling mortality refers to the expected loss of natural or planted tree seedlings as influenced by kinds of soil or topographic features. Losses caused by plant competition are excluded. It is assumed that the natural supply of seed is adequate, stock is good, seedlings are properly planted and cared for, and climatic conditions are normal. *Slight* means that losses normally are not more than 25 percent of the planted or natural stock; *moderate* indicates that losses are between 25 and 50 percent; and *severe* indicates that more than half of the planted or natural stock is likely to die.

Plant competition refers to the rate at which unwanted trees, shrubs, and weeds are likely to invade a given site where openings are made in the canopy. *Slight* means that competition is not a major problem,

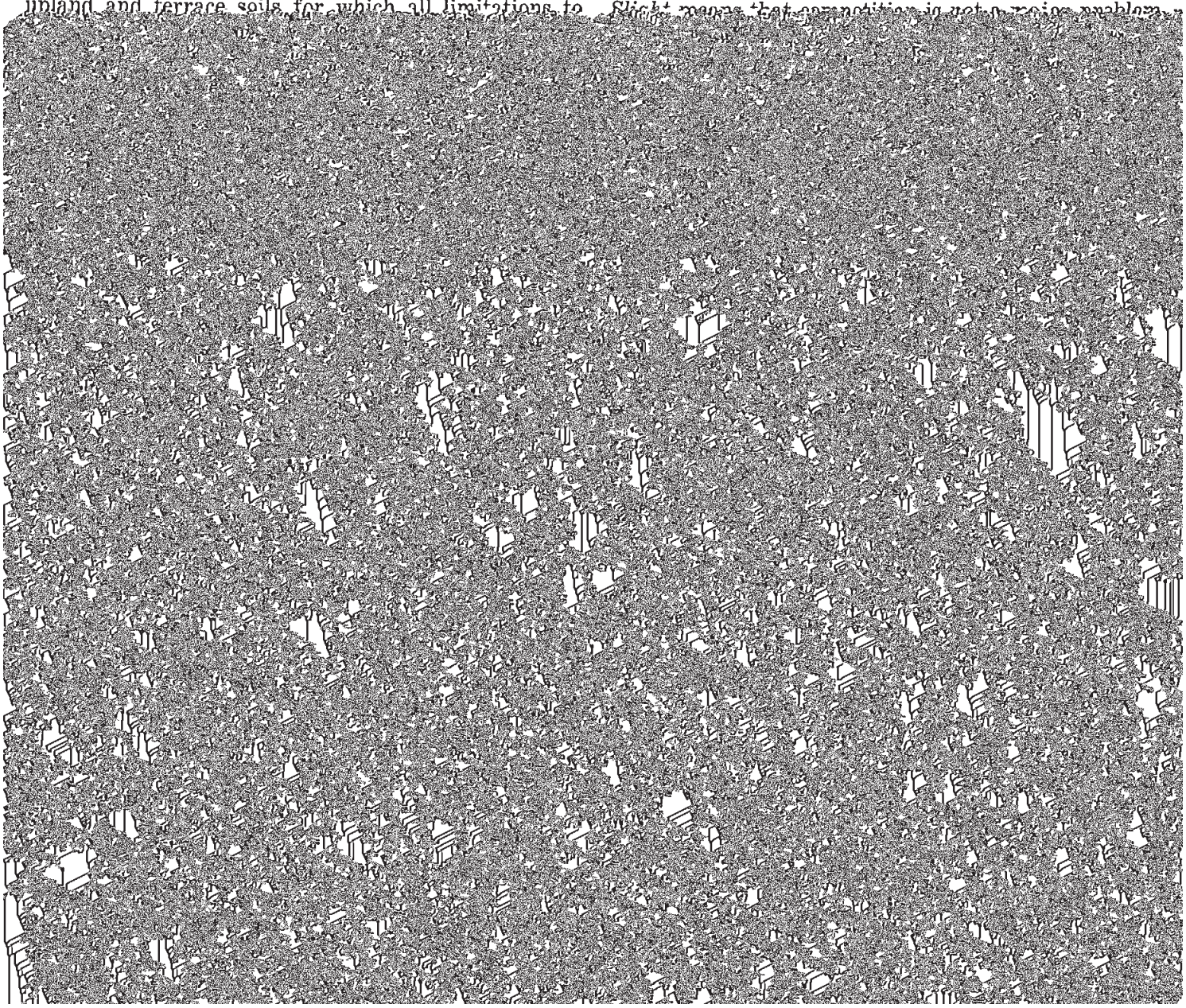


TABLE 4.—*Predicted average yields per acre of principal crops*

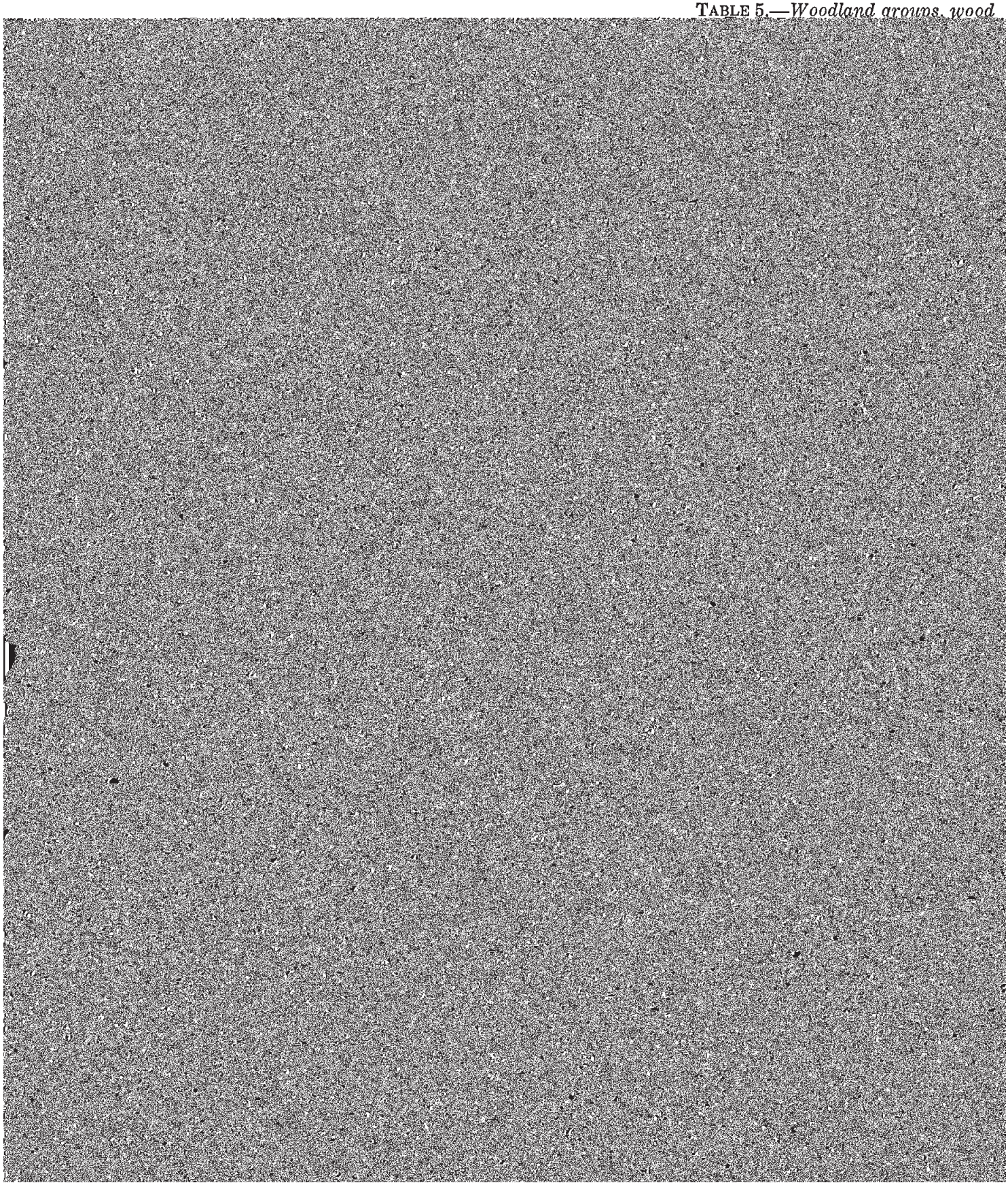
[Figures represent yields to be expected under a high level of management. Absence of a yield figure indicates that the soil is not well suited to the crop or that the crop is not commonly grown. Only arable soils are listed]

Soil	Corn	Soybeans	Oats	Alfalfa-grass[1]:		Red clover and grass[1]		Fescue[1]		Kentucky bluegrass pasture
	Bu	*Bu*	*Bu*	*Tons*	*AUD*[2]	*Tons*	*AUD*[2]	*Tons*	*AUD*[2]	*AUD*[2]
Atterberry silt loam	130	45	80	5.0	250	4.0	200	3.0	150	150
Burkhardt-Saude complex, 0 to 4 percent slopes (Burkhardt soil only)	65	22	45	2.5	125	1.5	75	1.0	50	75
Calco silty clay loam	110	42	70	4.5	225	3.5	175	3.0	150	100
Calco silty clay loam, wet	-----	-----	----	-----	-----	-----	-----	-----	-----	75
Canisteo silt loam	115	40	70	4.8	240	3.0	150	2.5	125	125
Coffeen silt loam	135	48	80	5.5	275	4.5	225	3.5	175	150
Coyne fine sandy loam, 0 to 4 percent slopes	80	28	60	3.2	160	2.5	125	2.0	100	100
Coyne fine sandy loam, 4 to 12 percent slopes	70	25	55	2.8	140	2.5	125	2.0	100	75
Denny silt loam	105	38	65	3.8	190	2.5	125	2.0	100	50
Dickinson sandy loam, 0 to 4 percent slopes	80	28	60	3.2	160	2.0	100	2.0	100	50
Dickinson sandy loam, 4 to 12 percent slopes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 4.—*Predicted average yields per acre of principal crops—Continued*

Soil	Corn	Soybeans	Oats	Alfalfa-grass[1]:		Red clover and grass[1]		Fescue[1]		Kentucky bluegrass pasture
Orion silt loam	115	40	70	4.8	240	3.5	175	3.0	150	100
Otter silt loam	110	38	65	4.8	240	3.5	175	3.0	150	75
Otter silt loam, wet	-----	-----	----	-----	-----	-----	-----	-----	-----	50
Port Byron silt loam, 0 to 2 percent slopes	125	45	75	5.2	260	4.0	200	3.0	150	125
Port Byron silt loam, 2 to 6 percent slopes	120	42	70	5.0	250	4.0	200	3.0	150	125
Raddle silt loam, 0 to 2 percent slopes	130	45	80	5.5	275	4.0	200	3.0	150	125
Raddle silt loam, 2 to 6 percent slopes	125	45	75	5.2	260	4.0	200	3.0	150	125
Radford silt loam	120	42	70	5.2	260	4.0	200	3.0	150	125
Rozetta silt loam	120	42	70	5.2	260	4.0	200	3.0	150	125
Sable silty clay loam	130	45	80	5.2	260	4.0	200	3.0	150	100
Saude loam	90	32	60	3.8	190	3.0	150	3.0	150	125
Sawmill silty clay loam	120	42	70	4.8	240	3.5	175	3.0	150	75
Sawmill silty clay loam, wet										50

TABLE 5.—*Woodland groups, wood*



crops, and soil-related limitations

Windthrow hazard	Species to be favored in existing stands	Species suitable for planting—					
		Cool sites on north- and east-facing slopes if erosion is—		Hot sites on south- and west-facing slopes if erosion is—		In windbreaks	
		None to moderate	Severe	None to moderate	Severe	Trees	Shrubs
----------	----------	White oak, black walnut, red oak, ash, white pine, red pine, sugar maple.	----------	Red pine, Scotch pine, black locust.	----------	White pine, red pine, Norway spruce, white spruce, Douglas-fir.	Forsythia, silky dogwood, autumn-olive, Amur maple, gray dogwood, Russian-olive, Amur honeysuckle, spirea, American cranberry bush, lilac.
Slight ------	White oak, red oak, yellow-poplar, ash.	White oak, black walnut, red oak, ash, white pine, red pine, sugar maple.	Red pine, Scotch pine, black locust.	Red pine, Scotch pine, black locust.	Red pine, Scotch pine, redcedar, black locust.	White pine, red pine, Norway spruce, white spruce, Douglas-fir.	Forsythia, silky dogwood, autumn-olive, Amur maple, gray dogwood, Russian-olive, Amur honeysuckle, spirea, American cranberry bush, lilac.
Slight ------	White oak, red	White oak,	Red pine,	Red pine,	Red pine,	White pine,	Forsythia, silky

TABLE 5.—*Woodland groups, wood crops,*

Woodland suitability groups	Potential productivity			Erosion hazard	Equipment limitation	Seedling mortality	Plant competition
	Species	Site index	Annual growth per acre[1]				
Group 2o4: Dominantly soils are somewhat poorly drained, have slopes of 0 to 2 percent, and are on bottom land. They have a silt loam surface layer, and a silt loam substratum. They are dominantly moderately permeable and have moderate to very high available water capacity. All are subject to flooding. The Dorchester and Landes soils are better drained than other soils in this group; and the Landes soil has a sandier surface layer and substratum, is more rapidly permeable, and has a lower water-holding capacity. Coffeen: 428. Dorchester: 239. Landes: 304. Lawson: 451. Mixed alluvial land: 455. Orion: 415. Radford: 74.	Cottonwood Pin oak	95–105 85–95	450–550 350–450	Slight	Slight	Slight	Severe
Group 2r2: Well drained and moderately well drained soils that have slopes of 12 to 60 percent and are on uplands and terraces. They have a silt loam or silty clay loam surface layer and a silt loam, silty clay loam, or silty clay subsoil. They are moderately permeable to slowly permeable and have high to very high available water capacity. Clayey terrace escarpments: 577. Elkhart: 567E2. Seaton: 274E2. Sylvan: 19E, 19E3, 19F, 19F3. Sylvan-Bold: 962F. No natural woodland on Elkhart soils.	Upland oaks.[2]	75–85	250–350	Moderate to severe.	Moderate	Slight to moderate.	Moderate
Group 2w3: Poorly drained soils that have slopes of less than 2 percent and are on uplands and terraces. They have a silt loam or silty clay loam surface layer and a silt loam, silty clay, or silty clay loam subsoil. They are slowly permeable to moderately permeable and have moderate to very high available water capacity. Bedrock is at a depth of less than 5 feet in the Millsdale soils. Canisteo: 347. Millsdale: 317. Sable: 68. No natural woodland on these soils.							

See footnotes at end of table.

and soil-related limitations—Continued

Windthrow hazard	Species to be favored in existing stands	Species suitable for planting—					
		Cool sites on north- and east-facing slopes if erosion is—		Hot sites on south- and west-facing slopes if erosion is—		In windbreaks	
		None to moderate	Severe	None to moderate	Severe	Trees	Shrubs
Slight	Cottonwood, sycamore, yellow-poplar, pin oak.	Cottonwood, pin oak, sycamore, red maple, swamp white oak, ash.	----------	----------	----------	White pine, red pine, Norway spruce, white spruce, Douglas-fir, arborvitae.	Silky dogwood, Amur maple, American cranberry bush, forsythia.
Slight	White oak, red oak, black walnut.	White oak, black walnut, red oak, ash, white pine, red pine, sugar maple.	Red pine, Scotch pine, black locust.	Red pine, ash, Scotch pine, black locust, redcedar.	Red pine, Scotch pine, redcedar.	White pine, red pine, Norway spruce, white spruce, Douglas-fir.	Forsythia, silky dogwood, autumn-olive, Amur maple, gray dogwood, Russian-olive, Amur honeysuckle, spirea, American cranberry bush, lilac.
----------	----------	Cottonwood, pin oak, sycamore, red maple, swamp white oak, ash.	----------	----------	----------	Arborvitae	Silky dogwood, Amur maple, American cranberry bush, forsythia.

TABLE 5.—*Woodland groups, wood crops,*

Woodland suitability groups	Potential productivity			Erosion hazard	Equipment limitation	Seedling mortality	Plant competition
	Species	Site index	Annual growth per acre[1]				
Group 2w5: Poorly drained soils that have slopes of less than 2 percent and are on bottom lands. The surface layer and substratum are loam, silt loam, or silty clay loam. These soils are moderately permeable to moderately slowly permeable and have high available water capacity. They are subject to flooding. Calco: 400, W400. Millington: 82, W82. Otter: 76, W76.	Pin oak Cottonwood	85–95 95–105	350–450 450–550	Slight	Moderate	Moderate	Severe

and soil-related limitations—Continued

Windthrow hazard	Species to be favored in existing stands	Species suitable for planting—					
		Cool sites on north- and east-facing slopes if erosion is—		Hot sites on south- and west-facing slopes if erosion is—		In windbreaks	
		None to moderate	Severe	None to moderate	Severe	Trees	Shrubs
Slight	Pin oak, cottonwood, sycamore.	Cottonwood, pin oak, sycamore, red maple, swamp white oak, ash.	----------	----------	----------	Arborvitae	Silky dogwood, Amur maple, American cranberry bush, forsythia.
----------	----------	Cottonwood, pin oak, sycamore, red maple, swamp white oak, ash.	----------	----------	----------	Arborvitae	Silky dogwood, Amur maple, American cranberry bush, forsythia.
Slight	White oak, red oak, ash, bur oak.	White pine, Scotch pine, redcedar, pine.	White pine, Scotch pine, redcedar, black locust, red pine.	White pine, red pine.	Scotch pine, black locust, jack pine, red pine, redcedar, osage-orange.	White pine, Norway spruce, Douglas-fir, red pine, arborvitae, white spruce.	Silky dogwood, gray dogwood, autumn-olive, Amur maple, Russian-olive, spirea.

TABLE 5.—*Woodland groups, wood crops,*

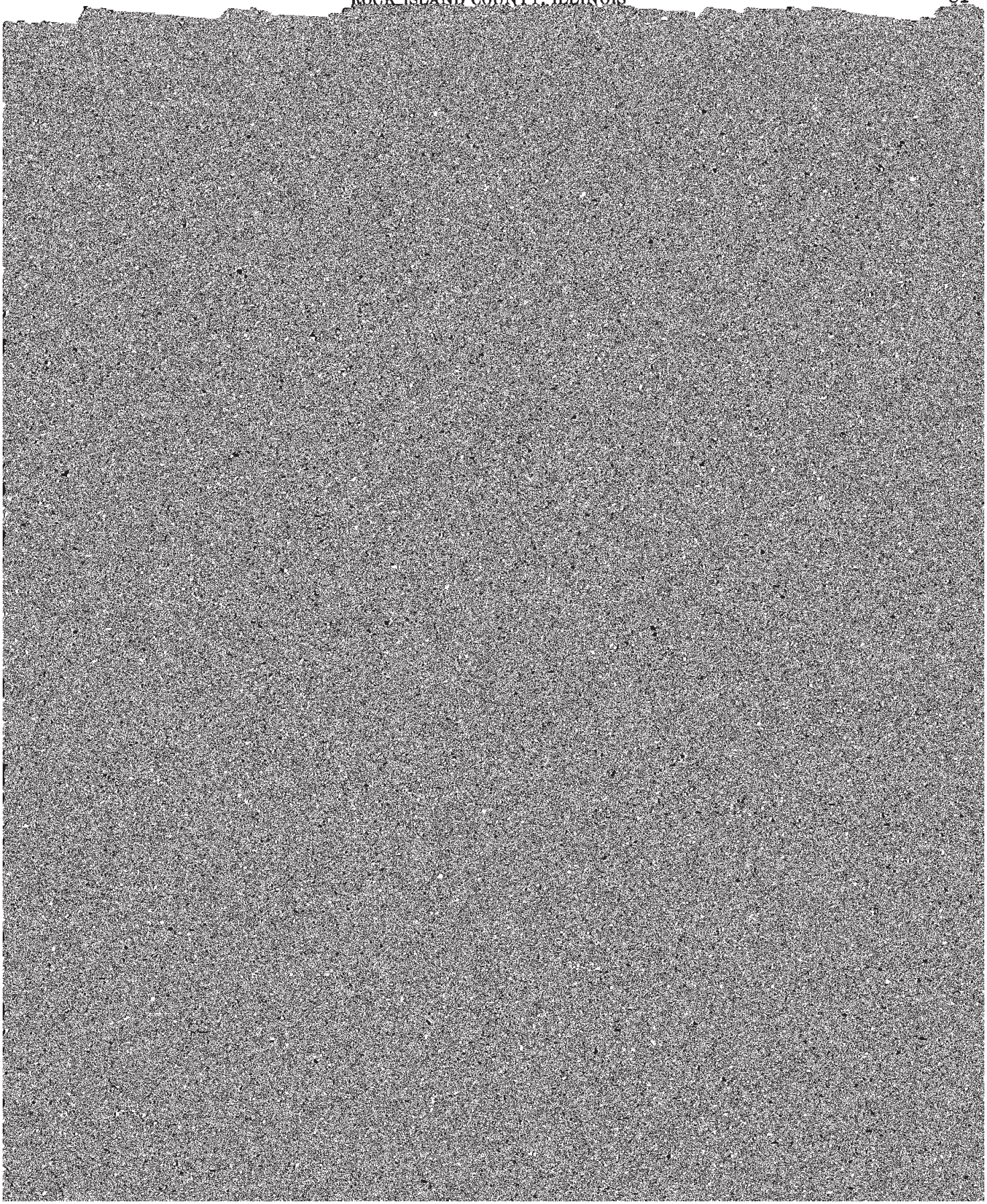
Woodland suitability groups	Potential productivity			Erosion hazard	Equipment limitation	Seedling mortality	Plant competition
	Species	Site index	Annual growth per acre[1]				
Group 3r2: Dominantly somewhat poorly drained to well drained soils that have slopes of 12 to 30 percent and are on uplands. They have a silt loam surface layer and a silt loam, silty clay, or silty clay loam subsoil. They are very slowly permeable to moderately permeable, and have moderate to high available water capacity. Coatsburg soils are poorly drained. Hickory-Atlas: 946E3, 946F3. Hickory-High Gap: 945E2, 945F. Seaton-Timula: 943E2, 943F2. Velma-Coatsburg: 944E2. No natural woodland on the Velma-Coatsburg soils.	Upland oaks.[2]	65–75	150–250	Moderate	Moderate	Moderate	Slight
Group 3r3: Well drained and moderately well drained soils that have slopes of 18 to 60 percent and are on uplands. They have a loamy fine sand, loam, or silt loam surface layer and a fine silty clay loam subsoil. They are sand, silt loam, clay loam, or moderately permeable to very rapidly permeable and have very low to high available water capacity. Hickory-High Gap: 945G. Hickory-Sylvan: 960G. Oakville: 741F. Seaton-Oakville: 942F2. Strawn-Chute: 959G.	Upland oaks.[2]	65–75	150–250	Severe	Severe	Severe	Slight

and soil-related limitations—Continued

Windthrow hazard	Species to be favored in existing stands	Species suitable for planting—					
		Cool sites on north- and east-facing slopes if erosion is—		Hot sites on south- and west-facing slopes if erosion is—		In windbreaks	
		None to moderate	Severe	None to moderate	Severe	Trees	Shrubs
Slight	White oak, red oak, white ash, bur oak.	White pine, Scotch pine, redcedar, pine.	White pine, Scotch pine, redcedar, black locust, red pine.	White pine, red pine.	Scotch pine, black locust, jack pine, red pine, redcedar, osage-orange.	White pine, Norway spruce, Douglas-fir, red pine, arborvitae, white spruce.	Silky dogwood, gray dogwood, autumn-olive, Amur maple, Russian-olive, spirea.
Slight	Red oak, white oak, bur oak, white ash.	Redcedar, white pine, red pine, Scotch pine.	White pine, Scotch pine, redcedar, black	White pine, red pine.	Scotch pine, black locust, jack pine, red pine,	White pine, red pine, Norway spruce, Douglas-	Russian-olive, autumn-olive, silky dogwood, gray dogwood, autumn-olive,

TABLE 5.—*Woodland groups, wood crops,*

Woodland suitability groups	Potential productivity			Erosion hazard	Equipment limitation	Seedling mortality	Plant competition
	Species	Site index	Annual growth per acre[1]				
Group 3s3: Well drained to excessively drained soils that have	Upland oaks.[2]	65–75	150–250	Moderate	Moderate to severe.	Severe	Slight



areas consisting of hardwood trees and shrubs. Wildlife habitat elements used to rate the soils for this kind of wildlife are grasses and legumes, wild herbaceous plants, and hardwood plants.

Wetland wildlife includes various kinds of waterfowl, muskrat, mink, kingfisher, red-winged blackbird and other birds and mammals that normally live in wet

based on soil characteristics such as natural drainage, seasonal high water table, hazard of flooding, permeability, slope, texture of the surface layer, and stoniness or rockiness. Ratings are not given for Borrow pit, Cut and fill land, Gravel pit, or Quarry.

The ratings are slight, moderate, or severe. A rating of *slight* means that the soil has few if any limitations

Cottages and utility buildings.—These are cottages, washrooms and bathrooms, picnic shelters, and service buildings that are used seasonally or all year. The ratings are based mainly on soil features that contribute to the adequate support of these buildings. Additional information on soil limitations for septic tank filter fields is given in the section "Engineering."

Campsites.—These are areas suitable for tents and trailers and for living outdoors for a period of 1 week or more. Little site preparation should be required. The soils are rated according to their limitations for unsurfaced parking areas for cars and camp trailers and for heavy traffic by people, horses, and small vehicles such as bicycles.

Picnic areas.—Soils used for picnic areas need to support intensive foot traffic. Features that affect the desirability of a site, such as trees or ponds, are not considered in the ratings.

Playgrounds.—These areas are developed for intensive play and for organized games such as baseball, football, and tennis. They are subject to intensive foot traffic.

Paths and trails.—Soils used for paths and trails need to support intensive foot traffic and horses. Little preparation should be needed. Paths and trails on sloping soils should be contoured to control erosion.

Golf fairways.—The soils are rated only according to their limitations for fairways. Greens, traps, and hazards generally are made from transported soil material. Soils used for fairways should support intensive foot traffic and golf carts. In addition, turf and various kinds of trees and shrubs should grow well on these soils.

of soils for wildlife

Elements of wildlife habitat—Continued			Kinds of wildlife		
Hardwood plants	Wetland plants	Shallow water developments	Openland wildlife	Woodland wildlife	Wetland wildlife
Good	Very poor: no suitable plants for food and cover.	Very poor: water table too deep.	Good on all slopes; fair if severely eroded.	Good on all slopes; fair if severely eroded.	Very poor: no suitable wetland food and cover plants; water supply limited.
Good	Very poor: no suitable plants for	Very poor: sloping; water table too	Fair: production of grain and seed	Good: production of grasses and	Very poor: no suitable wetland food

TABLE 6.—*Suitability of soils*

Wildlife groups	Elements of wildlife habitat		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants
Group 4: Somewhat poorly drained, nearly level soils on uplands and terraces. Atterberry: 61. Hoopeston: 172. Joy: 275. Lawler: 647. Muscatine: 41. Stronghurst: 278.	Good for drained areas; fair for undrained areas; wetness hazard.	Good for drained areas; fair for undrained areas; wetness hazard.	Good
Group 5: Somewhat poorly drained, nearly level soils on bottom lands. Coffeen: 428. Dorchester: 239.[3] Landes: 304.[4] Lawson: 451. Mixed alluvial land: 455. Orion: 415. Radford: 74.	Fair for most soils: wetness and flooding hazard; good for Dorchester soils and all drained areas.	Fair for most soils: wetness and flooding hazard; good for Dorchester soils and all drained areas.	Good for most soils; fair for Landes soils.
Group 6: Poorly drained to very poorly drained, nearly level soils on uplands, terraces and bottom lands. Calco: 400, W400. Canisteo: 347. Denny: 45. Marsh: 718. Millington: 82, W82. Millsdale: 317. Montgomery: 465. Niota: 261. Otter: 76, W76. Sable: 68. Sawmill: 107, W107. Wabash: 83.	Good for drained areas; poor for undrained areas; wetness hazard, flooding, or ponding limits growth; very poor for all wet soils and Marsh.	Good for drained areas; poor for undrained areas; wetness hazard, flooding, or ponding limits growth.	Good for drained areas; fair for undrained areas; wetness hazard, flooding, or ponding limits growth; poor for all wet soils and Marsh.
Group 7: Well-drained to somewhat excessively drained, nearly level to very steep soils on uplands and terraces. Blown-out land: 63. Burkhardt-Saude: 961A. Dickinson: 87A, 87C. Gravelly terrace escarpments: G577. Lamont, Tell, and Bloomfield: 947C2, 947F2. Oakville: 741C, 741F. Saude: 774. Seaton-Oakville: 942D2, 942E2, 942F2. Sparta: 88B. Strawn-Chute: 959G.	Very poor for most soils: slope; low available water capacity; fair for Burkhardt-Saude, Dickinson, and Saude soils.	Poor for most soils: slope; low available water capacity; fair for Burkhardt-Saude, Dickinson, and Saude soils.	Poor for most soils: slope; low available water capacity; fair for Burkhardt-Saude, Dickinson, and Saude soils.

[1] Atlas soils are somewhat poorly drained.
[2] Coatsburg soils are poorly drained.
[3] Dorchester soils are well drained and moderately well drained.
[4] Landes soils are well drained.

for wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Hardwood	Wetland	Shallow water	Openland	Woodland	Wetland

TABLE 7.—*Soils and*

Recreation group, soil series, and map symbols	Degree of limitation and soil features affecting use for—	
	Cottages and utility buildings	Campsites
Group 1: Well drained and moderately well drained, nearly level to moderately sloping soils on uplands and terraces. Coyne: 764A. Downs: 386A, 386B. Fayette: 280B, 280C2. Hitt variant: V506A. Joslin: 763A, 763B. Martinsville: 570B. Port Byron: 277A, 277B. Raddle: 430A, 430B. Rozetta: 279. Seaton: 274B, 274C2. Seaton sandy substratum: 563B. Tama: 36A, 36B, 36C2. Trempealeau: 765A. Waukee: 727A.	Slight for all but the Hitt shallow variant. Severe for Hitt soil: limestone bedrock at a depth of 20 to 40 inches.	Slight
Group 2: Somewhat excessively drained and well drained, nearly level and gently sloping soils on uplands and terraces. Blown-out land: 63. Burkhardt-Saude: 961A. Dickinson: 87A. Saude: 774. Sparta: 88B.	Slight for Burkhardt, Dickinson, and Saude soils. Moderate for Sparta soil. Severe for Blown-out land. All soils are droughty.	Slight for Burkhardt, Dickinson, and Saude soils. Moderate to severe for Blown-out land and Sparta soils: sandy surface layer; droughtiness; soil blowing; inherent low fertility; difficult to maintain plant cover.
Group 3: Somewhat excessively drained, well drained, and moderately well drained, moderately sloping and strongly sloping soils on uplands and terraces. Coyne: 764C. Dickinson: 87C. Elkhart: 567D2. Fayette: 280D2, 280D3. Lamont, Tell, and Bloomfield: 947C2. Martinsville: 570D3. Oakville: 741C. Seaton: 274D2. Seaton-Oakville: 942D2. Seaton-Timula: 943D2. Sylvan: 19D3. Tama: 36D2.	Slight if slope is less than 7 percent, moderate if 7 to 12 percent. Oakville and Bloomfield soils are subject to blowing, are droughty, and have inherent low fertility.	Slight for all but Oakville and Bloomfield soils if slope is less than 7 percent, moderate if 7 to 12 percent. Moderate for Oakville and Bloomfield soils if slope is 7 to 12 percent, severe if more than 12 percent. In addition, these soils have a sandy surface layer and inherent low fertility, are droughty, and are subject to blowing. Maintaining a plant cover is difficult.
Group 4: Somewhat excessively drained, well drained, and moderately well drained, moderately steep to very steep soils on uplands. Clayey terrace escarpments: 577. Elkhart: 567E2. Gravelly terrace escarpments: G577. Hickory: 8E2, 8E3, 8F, 8F3. Hickory-Atlas: 946E3, 946F3. Hickory-High Gap: 945E2, 945F, 945G. Hickory-Sylvan-Fayette: 960E2, 960E3, 960F. Hickory-Sylvan: 960F3, 960G. Lamont, Tell, and Bloomfield: 947F2. Martinsville: 570E3. Oakville: 741F. Seaton: 274E2. Seaton-Oakville: 942E2, 942F2. Seaton-Timula: 943E2, 943F2. Strawn-Chute: 959G. Sylvan: 19E, 19E3, 19F, 19F3. Sylvan-Bold: 962F. Velma: 250E. Velma-Coatsburg: 944E2.	Severe: slope	Severe: slope

recreational facilities

Degree of limitation and soil features affecting use for—Continued			
Picnic areas	Playgrounds	Paths and trails	Golf fairways
Slight for all but Coyne, Trempealeau, and Waukee soils. These soils are somewhat droughty.	Slight if slope is less than 12 percent, moderate if 2 to 7 percent. Moderate for Hitt shallow variant: limestone bedrock at a depth of 20 to 40 inches.	Slight	Slight.
Slight for Burkhardt, Dickinson, and Saude soils: droughtiness. Moderate to severe for Sparta soils and Blown-out land: soil blowing; sandy surface layer; droughtiness; inherent low fertility.	Slight for Burkhardt, Dickinson, and Saude soils: droughtiness. Severe for Blown-out land and Sparta soils: sandy surface layer; soil blowing; droughtiness; inherent low fertility; difficult to maintain plant cover.	Slight for Burkhardt, Dickinson, and Saude soils. Moderate to severe for Blown-out land and Sparta soils; sandy surface layer; droughtiness; soil blowing; inherent low fertility.	Slight for Dickinson soils. Moderate for Burkhardt and Saude soils: droughtiness. Severe for Blown-out land and Sparta soils: sandy surface layer; soil blowing; droughtiness; low inherent fertility; difficult to maintain plant cover. All soils are a source of sand for gravel.
Slight if slope is less than 7 percent, moderate if 7 to 12 percent. Oakville and Bloomfield soils have sandy surface layer and low inherent fertility, are droughty, and are subject to blowing. Maintaining a plant cover is difficult.	Moderate if slope is less than 7 percent, severe if 7 to 12 percent. Oakville and Bloomfield soils have sandy surface layer and low fertility, are droughty, and are subject to blowing.	Slight for all but Oakville and Bloomfield soils. Moderate for Oakville and Bloomfield soils; sandy surface layer; low inherent fertility; hazard of soil blowing.	Moderate for all but Oakville and Bloomfield soils. Severe for Oakville and Bloomfield soils: slope; inherent low fertility; droughty; difficult to maintain turf. Dickinson, Lamont, Bloomfield, and Oakville soils are a source of sand for greens.
Severe: slope	Severe: slope	Moderate if slope is less than 12 to 18 percent, severe if more than 18 percent.	Severe: slope. Lamont, Bloomfield, and Oakville soils are a source of sand for greens.

TABLE 7.—*Soils and recreational*

Recreation group, soil series, and map symbols	Degree of limitation and soil features affecting use for—	
	Cottages and utility buildings	Campsites
Group 5. Somewhat poorly drained, nearly level soils on uplands and terraces. Atterberry: 61. Hoopeston: 172. Joy: 275. Lawler: 647. Muscatine: 41. Stronghurst: 278.	Moderate: seasonal water table at a depth of 12 to 36 inches; high to moderate frost action potential.	Moderate: seasonal water table at a depth of 12 to 36 inches. Stronghurst soils dry more slowly than other soils in this group.
Group 6: Somewhat poorly drained to well-drained, nearly level soils on bottom land. Coffeen: 428. Dorchester: 239. Landes: 304. Lawson: 451. Mixed alluvial land: 455. Orion: 415. Radford: 74.	Severe: subject to flooding; seasonal high water table; high frost action potential.	Severe: subject to flooding; seasonal high water table. Landes soils have a sandy surface layer, are droughty, and are subject to soil blowing; difficult to maintain plant cover.
Group 7: Poorly drained and very poorly drained, nearly level soils on uplands and terraces. Canisteo: 347. Denny: 45. Millsdale: 317. Montgomery: 465. Niota: 261. Sable: 68.	Severe: less than 12 inches to seasonal water table; soils dry slowly; moderate to high frost action potential; high to moderate shrink-swell potential in the subsoil. Millsdale soils have limestone bedrock between depths of 20 and 40 inches.	Severe: less than 12 inches to seasonal water table; soils dry slowly; moderate to high frost action potential; drainage needed in most places; turf easily damaged when wet.
Group 8: Poorly drained and very poorly drained, nearly level soils on bottom land. Calco: 400, W400. Marsh: 718. Millington: 82, W82. Otter: 76, W76. Sawmill: 107, W107. Wabash: 83.	Severe: subject to flooding and ponding; less than 12 inches to seasonal water table; soils dry slowly; high to moderate frost action potential.	Severe: subject to flooding and ponding; less than 12 inches to seasonal water table; soils dry slowly; drainage needed in most places.

Engineering[7]

This section shows the principal properties of soils that affect engineering practices. With the soil map for identification, the information presented should help engineers estimate the suitability of the soils for engineering uses. It is not intended that information in this section eliminate the need for onsite sampling and testing for design and construction of specific engineering works.

Information in this section can be used to—

1. Make studies that will aid in planning and developing agricultural, industrial, business, residential, and recreational sites.
2. Make preliminary evaluations of the soils that will aid in selecting locations for flood control structures, agricultural drainage systems, farm ponds, irrigation systems, terraces, diversions, and waterways.
3. Make preliminary evaluations of soils and sites that will aid in selecting locations for highways and airports and in planning detailed investigations at selected locations.
4. Locate probable sources of road and highway construction materials.
5. Correlate performance of engineering structures with soil mapping units to obtain information that will be useful in designing and maintaining such structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps, reports, and aerial photographs for the purpose of making maps and reports that can be used readily by engineers.
8. Make preliminary estimates for other construction purposes pertinent to the particular area.

Much of the information in this section is given in tables 8, 9, 10, and 11, which show, respectively, several estimated soil properties significant in engineering, soil interpretations that are useful to engineers for

[7] HERBERT L. DAVENPORT, agricultural engineer, Soil Conservation Service, Sterling, Illinois, helped prepare this section.

facilities—Continued

Degree of limitation and soil features affecting use for—Continued			
Picnic areas	Playgrounds	Paths and trails	Golf fairways
Moderate: seasonal water	Moderate: seasonal water	Moderate: seasonal water	Moderate: seasonal water

transmit water or air. The estimates in table 8 are in inches per hour and are based on the structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soil are not considered.

Available water capacity is the amount of water the soil can hold available for use by most plants. It essentially is the difference between the amount of water at field capacity and the amount at wilting point. It is commonly expressed in inches of water per inch of soil.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH indicates the corrosiveness of soil solution and the protection structures, such as pipelines, require when placed in the soil. Reaction is also used to estimate the suitability of certain plants for planting along highways and other areas where the soil has been disturbed. The pH value and related terms used to describe soil reaction are defined in the Glossary.

Shrink-swell potential indicates the volume change to be expected of a soil when the moisture content changes. The shrink-swell potential generally is high in very clayey soils and low in very sandy soils. Generally, a high shrink-swell potential indicates that the soil material is hazardous to use for engineering structures.

Some soils tend to cause corrosion of concrete conduits. The ratings in table 8 are only estimates of expected corrosivity. Extensive installations that cross soil boundaries or horizons are more likely to be damaged by corrosion than installations placed entirely in one kind of soil. Because conduits normally are not placed in the surface layer, ratings are not given for

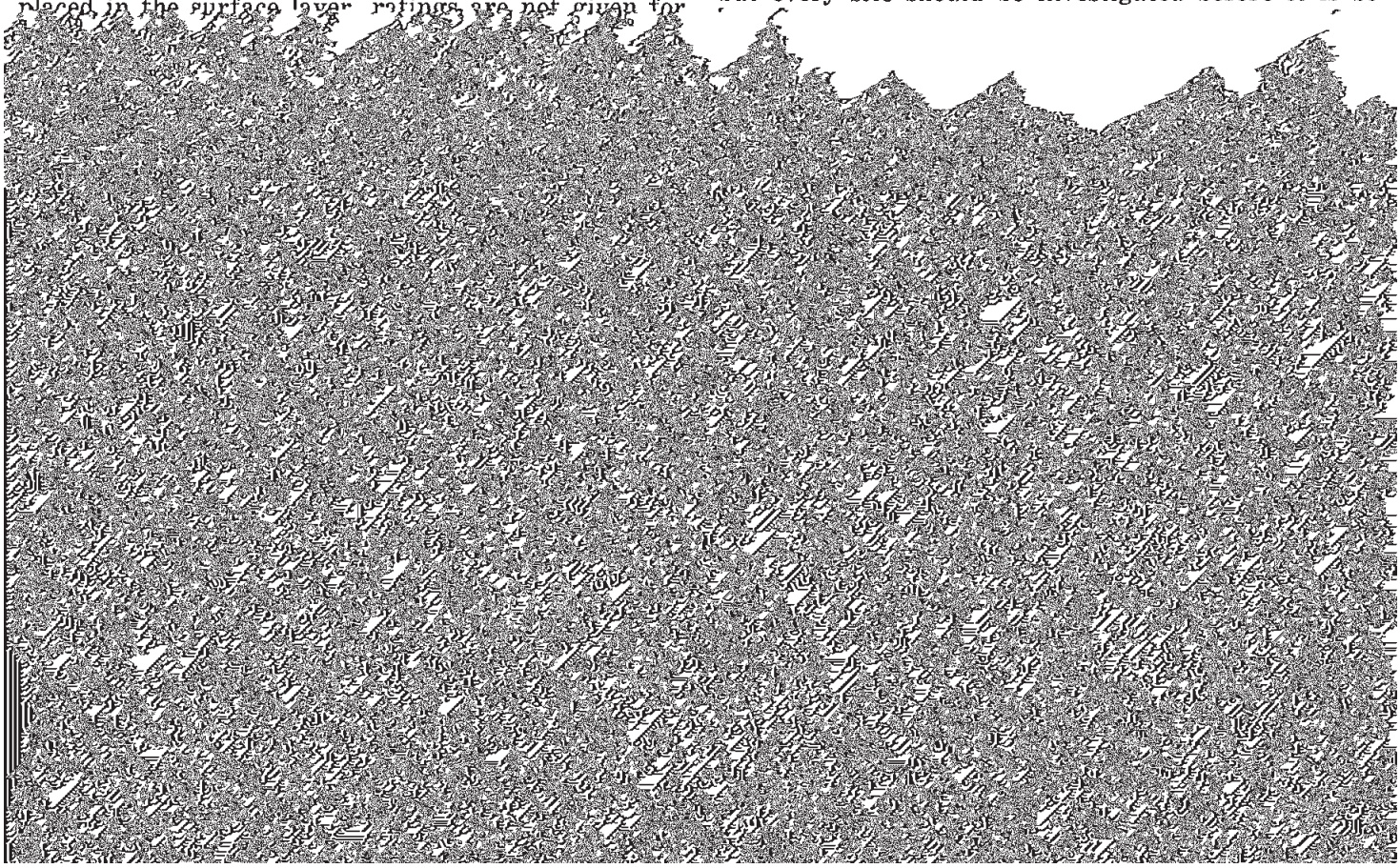
streets. The soils are also rated good, fair, and poor as sources of road fill, sand and gravel, and topsoil. Soil features are listed that affect winter grading; pond reservoir areas; construction of embankments, dikes, and levees; drainage of crops and pasture; irrigation; and construction of terraces, diversions, and grassed waterways. The ratings and other interpretations in this table are based on estimated engineering properties of the soils in table 8; on available test data, including those in table 11; and on field experience.

Septic tank absorption fields and sewage lagoons are affected mainly by permeability, location of water table, susceptibility to flooding, and slope. The principal reasons for rating limitations moderate or severe are given.

Shallow excavations are generally less than 6 feet deep and are made for basements, ditches, graves, underground cables, pipelines, and sewers.

Dwellings without basements are buildings less than three stories high. Ratings are based mainly on soil characteristics affecting foundations that extend only into the subsoil, or to a depth of 2 to 3 feet. Soil slope, susceptibility to flooding, seasonal wetness, depth to bedrock, and other conditions are also considered.

Trench-type sanitary landfill is a dug trench used to bury refuse. Soil properties that limit suitability for landfill are seasonally high water table, restricted soil drainage, hazard of flooding, high permeability, high slope gradient, and shallow depth to bedrock. The limitations indicate the need for further investigation, but every site should be investigated before it is se-



moved from borrow areas for these purposes.

Sand and gravel ratings are based on the probability that delineated areas of soil contain deposits of sand or

Engineering test data

Table 11 shows test data for samples of several types

TABLE 8.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Bold	>5	0–60	Silt	ML	A–4

significant in engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity potential for concrete conduits[1]
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)					
			Inches per hour	*Inches per inch of soil*	*pH*		
---------	100	90–100	0.6–2.0	0.17–0.19	7.9–8.4	Low ---------	Low.
90–100	80–90	20–40	2.0–6.0	0.12–0.15	5.1–6.5	Low ---------	Moderate.
60–80	50–70	0–15	6.0–20	0.02–0.04	5.6–6.5	Low ---------	Moderate.
100	95–100	85–95	0.2–0.6	0.21–0.23	7.9–8.4	High ---------	Low.
95–100	90–100	70–90	0.6–2.0	0.20–0.22	7.9–8.4	Low ---------	Low.
---------	100	70–90	0.6–2.0	0.22–0.24	7.9–8.4	Low.	
---------	100	70–90	0.6–2.0	0.22–0.24	7.9–8.4	Low ---------	Low.
100	90–100	60–80	0.6–2.0	0.17–0.22	7.4–8.4	Low ---------	Low.
100	100	20–35	6.0–20	0.05–0.09	6.6–8.4	Low ---------	Low.
---------	100	85–95	0.6–2.0	0.21–0.23	5.6–7.3	Moderate.	
90–100	90–100	75–90	<0.06	0.10–0.13	5.6–6.5	High ---------	Low to moderate.
90–100	80–100	60–75	0.2–0.6	0.14–0.16	6.1–7.3	Moderate ------	Low.
---------	100	60–80	0.6–2.0	0.22–0.24	5.6–7.3	Low.	
---------	100	60–80	0.6–2.0	0.20–0.22	5.6–7.3	Low ---------	Low.
100	95–100	0–15	6.0–20	0.05–0.07	5.6–7.3	Low ---------	Low.
---------	100	30–50	0.6–2.0	0.15–0.17	5.6–7.3	Moderate ------	Low.
100	95–100	20–40	2.0–6.0	0.13–0.15	5.6–7.3	Low.	
100	95–100	20–40	2.0–6.0	0.12–0.14	5.6–6.5	Low ---------	Moderate.
---------	100	80–95	0.6–2.0	0.18–0.20	5.6–6.5	Moderate ------	Low to moderate.
60–80	70–90	0–15	6.0–20	0.02–0.04	5.6–7.3	Low ---------	Low to moderate.
100	95–100	95–100	0.2–0.6	0.22–0.24	5.6–6.5	Low.	
---------	100	95–100	0.06–0.2	0.18–0.20	5.1–6.5	Moderate to high.	Moderate.
---------	100	95–100	0.2–0.6	0.20–0.22	6.1–7.8	Low ---------	Low to moderate.
---------	100	30–40	2.0–6.0	0.13–0.15	6.1–7.3	Low.	
---------	100	20–40	2.0–6.0	0.12–0.14	6.1–7.3	Low ---------	Low.
95–100	60–80	0–15	6.0–20	0.02–0.04	6.1–7.3	Low ---------	Low.
---------	100	80–100	0.6–2.0	0.22–0.24	7.4–8.4	Low.	
---------	100	35–50	2.0–6.0	0.15–0.17	7.4–8.4	Low ---------	Low.
---------	100	80–100	0.6–2.0	0.20–0.22	7.4–8.4	Moderate ------	Low.
---------	100	95–100	0.6–2.0	0.22–0.24	5.1–6.0	Moderate.	
---------	100	95–100	0.6–2.0	0.18–0.20	5.1–6.0	Moderate ------	Moderate.
---------	100	95–100	0.6–2.0	0.20–0.22	5.6–7.3	Low ---------	Low to moderate.
---------	100	95–100	0.6–2.0	0.22–0.24	5.6–7.3	Low.	
---------	100	95–100	0.6–2.0	0.18–0.20	5.6–7.8	Moderate ------	Low.
---------	100	95–100	0.6–2.0	0.20–0.22	7.9–8.4	Low ---------	Low.
---------	100	95–100	0.6–2.0	0.22–0.24	6.1–7.3	Low.	
---------	100	95–100	0.6–2.0	0.18–0.20	5.1–6.5	Moderate ------	Low to moderate.
---------	100	95–100	0.6–2.0	0.20–0.22	5.6–7.3	Low ---------	Low to moderate.
60–80	50–70	0–15	6.0–20	0.02–0.04	5.6–6.5	Low ---------	Moderate.

TABLE 8.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Gravel pit: G.P. No estimate of properties.					
*Hickory: 8E2, 8E3, 8F, 8F3, 945E2, 945F, 945G, 946E3, 946F3, 960E2, 960E3, 960F, 960F3, 960G. For High Gap part of 945E2, 945F, and 945G, see High Gap series. For Atlas part of 946E3, 946F3, see Atlas series. For Sylvan and Fayette parts of 960E2, 960E3, 960F, 960F3, 960G, see Sylvan and Fayette series.	3–5	0–10	Silt loam	ML or CL	A–4 or A–6
		10–17	Silty clay loam	CL	A–6
		17–48	Clay loam	CL	A–6 or A–7
		48–58	Silt loam	ML or CL	A–4 or A–6
High Gap[3] Mapped only with Hickory soils.	3–5	0–13	Silt loam	ML or CL	A–4 or A–6
		13–37	Clay loam	CL	A–6 or A–7
		37–55	Silty clay shale	CL	A–7
Hitt variant:[3] V506A	>5	0–14	Loam	ML or CL	A–4 or A–6
		14–20	Clay loam	CL	A–6 or A–7
		20–30	Sandy loam	SM or SC	A–2 or A–4
		30–60	Limestone bedrock.		
Hoopeston: 172	1–3	0–15	Sandy loam	SM or SC	A–2 or A–4
		15–22	Sandy loam	SM or SC	A–2 or A–4
		22–42	Stratified sand, sandy loam, loamy sand.	SM or SC	A–2
Joslin: 763A, 763B	>5	0–14	Silt loam	ML or CL	A–4 or A–6
		14–48	Silt loam	ML or CL	A–4 or A–6
		48–60	Silty clay	CH	A–7
		60–85	Silt loam	ML or CL	A–4 or A–6
Joy: 275	1–3	0–14	Silt loam	ML, CL, or OL	A–6 or A–4
		14–48	Silt loam	ML or CL	A–4 or A–6
		48–60	Silt loam	ML or CL	A–4 or A–6
*Lamont: 947C2, 947F2 For Tell part of 947C2 and 947F2, see Tell series; for Bloomfield part, see Bloomfield series.	>5	0–11	Fine sandy loam	SM or ML	A–4
		11–28	Fine sandy loam	SM or ML	A–4
		28–63	Fine sandy loam with layers of sand.	SM or SP	A–2 or A–3
Landes: 304	[2]3–5	0–29	Loamy sand	SM	A–2
		29–39	Loam	CL	A–6
		39–60	Sand	SM or SP	A–2 or A–3
Lawler: 647	1–3	0–15	Loam	ML or CL	A–7 or A–6
		15–28	Sandy clay loam	SC or CL	A–6
		28–60	Sand and fine gravel	SP or SM	A–1
Lawson: 451	[2]1–3	0–60	Silt loam	ML or CL	A–4 or A–6
Marsh: 718. Too wet to make accurate determinations. Onsite investigations are necessary.					
Martinsville: 570B, 570D3, 570E3	>5	0–12	Loam	ML or CL	A–4 or A–6
		12–42	Clay loam	CL	A–6 or A–7
		42–60	Stratified silt loam, loam, and sandy loam.	ML or CL, SM or SC	A–2, A–4, or A–6
Millington: 82, W82	[2]0–1	0–40	Silt loam	ML, CL, or OL	A–4 or A–6
		40–60	Sand	SM or SP	A–2 or A–3
Millsdale[3]: 317	0–1	0–15	Silty clay loam	CL, CH, or OH	A–7
		15–27	Silty clay	CH	A–7
		27–60	Limestone bedrock.		

significant in engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity potential for concrete conduits[1]
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)					
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	90–100	60–95	0.6–2.0	0.22–0.24	5.1–7.8	Low.	
95–100	90–100	55–95	0.6–2.0	0.18–0.20	4.5–6.0	Moderate	Moderate to high.
95–100	90–100	55–80	0.6–2.0	0.15–0.19	4.5–6.0	Moderate	Moderate to high.
90–100	80–95	60–80	0.2–2.0	0.20–0.22	6.6–8.4	Low	Low.
95–100	90–100	60–90	0.6–2.0	0.22–0.24	5.1–6.5	Low.	
95–100	90–100	60–80	0.6–2.0	0.15–0.19	4.5–6.5	Moderate	Moderate to high.
----------	100	90–100	<0.06	0.10–0.12	6.6–8.4	High	Low.
95–100	90–100	60–75	0.6–2.0	0.20–0.22	6.6–7.8	Low.	
95–100	90–100	70–80	0.6–2.0	0.15–0.19	6.6–7.8	Moderate	Low.
95–100	90–100	30–40	2.0–6.0	0.12–0.14	6.6–7.8	Low	Low.
----------	100	30–40	2.0–6.0	0.13–0.15	5.1–6.5	Low.	
----------	100	30–40	2.0–6.0	0.12–0.14	5.1–6.5	Low	Moderate to high.
----------	100	15–35	6.0–20	0.05–0.13	5.6–7.8	Low	Low to moderate.
----------	100	70–90	0.6–2.0	0.22–0.24	6.6–7.8	Low.	
----------	100	75–95	0.6–2.0	0.20–0.22	5.6–6.5	Low	Low to moderate.
----------	100	90–95	0.2–0.6	0.10–0.12	6.1–7.3	High	Low.
95–100	90–100	75–95	0.6–2.0	0.20–0.22	6.6–8.4	Low	Low.
----------	100	95–100	0.6–2.0	0.22–0.24	6.1–7.3	Low.	
----------	100	95–100	0.6–2.0	0.20–0.22	6.1–7.3	Low	Low.
----------	100	95–100	0.6–2.0	0.20–0.22	6.6–7.8	Low	Low.
----------	100	40–60	2.0–6.0	0.16–0.18	5.1–7.3	Low.	
----------	100	40–60	2.0–6.0	0.15–0.17	5.6–6.5	Low	Moderate.
----------	100	0–15	6.0–20	0.05–0.16	5.6–6.5	Low	Moderate.
----------	100	15–30	6.0–20	0.10–0.12	6.1–7.3	Low.	
----------	100	60–75	0.6–2.0	0.17–0.19	6.1–7.3	Low	Low.
----------	100	0–15	6.0–20	0.05–0.07	6.1–7.3	Low	Low.
----------	100	60–75	0.6–2.0	0.20–0.22	5.6–6.5	Moderate.	

TABLE 8.—*Estimates of soil properties*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Mixed alluvial land: 455. No valid estimates can be made. Onsite determination is necessary.					
Montgomery: 465	0–1	0–14	Silty clay loam	CL, CH, or OH	A–7
		14–46	Silty clay	CH	A–7
		46–64	Clay	CH	A–7
		64–74	Silty clay loam	CL	A–6 or A–7
Muscatine: 41	1–3	0–20	Silt loam	ML, CL, or OL	A–6 or A–7
		20–57	Silty clay loam	CL	A–7
		57–60	Silt loam	ML or CL	A–6 or A–7
Niota: 261	0–1	0–14	Silt loam	ML or CL	A–4 or A–6
		14–24	Silty clay	CH	A–7
		24–53	Silty clay loam	CH	A–7
		53–60	Silt loam and silty clay loam.	ML or CL	A–6 or A–7
Oakville: 741C, 741F	>5	0–64	Fine sand	SM	A–2
Orion: 415	[2]1–3	0–27	Silt loam	ML or CL	A–4 or A–6
		27–45	Silt loam	ML or CL	A–4 or A–6
Otter: 76, W76	[2]0–1	0–31	Silt loam	ML, CL, or OL	A–6 or A–7
		31–64	Silt loam	ML or CL	A–4 or A–6
Port Byron: 277A, 277B	>5	0–16	Silt loam	ML, CL, or OL	A–4, A–6, or A–7
		16–47	Silt loam	ML or CL	A–4 or A–6
		47–60	Silt loam	ML or CL	A–4 or A–6
Quarry: Qu. No estimate of properties.					
Raddle: 430A, 430B	3–5	0–19	Silt loam	ML	A–4
		19–48	Silt loam	ML	A–4
		48–52	Fine sandy loam	SM or ML	A–4
		52–71	Silt loam	ML or CL	A–4 or A–6
Radford: 74	[2]1-3	0–27	Silt loam	ML or CL	A–4 or A–6
		27–64	Silty clay loam	CL	A–6 or A–7
Rozetta: 279	3–5	0–8	Silt loam	ML or CL	A–4 or A–6
		8–62	Silty clay loam	CL	A–6 or A–7
		62–68	Silt loam	ML or CL	A–4 or A–6
Sable: 68	0–1	0–23	Silty clay loam	CL, CH, or OH	A–7
		23–57	Silty clay loam	CL or CH	A–7
		57–60	Silt loam	ML or CL	A–4 or A–6
Saude: 774	>5	1–29	Loam	SM or ML	A–4
		29–40	Sand and fine gravel	SP or SM	A–1
Sawmill: 107, W107	[2]0–1	0–32	Silty clay loam	CL, CH, or OH	A–7
		32–60	Silty clay loam	CL	A–6 or A–7
*Seaton: 274B, 274C2, 274D2, 274E2, 942D2, 942E2, 942F2, 943D2, 943E2, 943F2. For Oakville part of 942D2, 942E2, and 942F2, see Oakville series. For Timula part of 943D2, 943E2, and 943F2, see Timula series.	>5	0–10	Silt loam	ML or CL	A–4 or A–6
		10–55	Silt loam	ML or CL	A–4 or A–6
		55–65	Silt	ML	A–4
Seaton sandy substratum: 563B	>5	0–8	Silt loam	ML or CL	A–4 or A–6
		8–38	Silt loam	ML or CL	A–4 or A–6
		38–80	Fine sand	SM or SP	A–2 or A–3
Sparta: 88B	>5	0–60	Sand	SM or SP	A–2 or A–3

significant in engineering—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity potential for concrete conduits[1]
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)					
			Inches per hour	*Inches per inch of soil*	*pH*		
100	95–100	85–100	0.6–2.0	0.21–0.23	6.6–7.8	Moderate.	
100	95–100	90–100	<0.2	0.11–0.13	6.6–7.8	High	Low.
---------	100	95–100	<0.2	0.08–0.10	6.6–7.8	High	Low.
---------	100	85–100	0.6–2.0	0.18–0.20	6.6–7.8	Moderate	Low.
---------	100	95–100	0.6–2.0	0.22–0.24	5.6–7.3	Moderate.	
---------	100	95–100	0.6–2.0	0.18–0.20	5.6–6.5	Moderate	Low to moderate.
---------	100	95–100	0.6–2.0	0.20–0.22	6.1–8.4	Moderate	Low.
---------	100	70–95	0.6–2.0	0.22–0.24	5.1–7.3	Low.	
---------	100	90–100	0.6–0.2	0.11–0.13	4.5–5.5	High	Moderate to high.
---------	100	85–100	0.6–2.0	0.18–0.20	4.5–5.5	Moderate	Moderate to high.
---------	100	70–100	0.6–2.0	0.20–0.22	5.6–6.5	Low	Low to moderate.
---------	100	20–35	>20	0.05–0.09	6.1–7.3	Low	Low to moderate.
---------	100	60–80	0.6–2.0	0.20–0.22	6.6–7.8	Low	Low.
---------	100	70–90	0.6–2.0	0.22–0.24	6.1–7.3	Low to moderate.	Low.

TABLE 8.—*Estimates of soil*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
*Strawn: 959G	>5	0–6	Loam	ML or CL	A–4 or A–6
For Chute part, see Chute series.		6–23	Clay loam	CL	A–6 or A–7
		23–40	Loam	ML or CL	A–4 or A–6
Stronghurst: 278	1–3	0–10	Silt loam	ML or CL	A–4 or A–6
		10–51	Silty clay loam	CL or CH	A–7
		51–60	Silt loam	ML or CL	A–4 or A–6
*Sylvan: 959G	>5	0–6	Silt loam	ML or CL	A–4 or A–6
For Bold part of 962F, see Bold series.		6–15	Silty clay loam	CL	A–6 or A–7
		15–60	Silt loam	ML or CL	A–4 or A–6
Tama: 36A, 36B, 36C2, 36D2	>5	0–20	Silt loam	ML, CL, OL, or OH	A–6 or A–7
		20–46	Silty clay loam	CL	A–6 or A–7
		46–60	Silty clay loam	CL	A–6
Tell	>5	0–25	Silt loam	ML	A–4
Mapped only with Lamont and Bloomfield soils.		25–60	Loamy fine sand	SM, SP-SM	A–2
Timula	>5	0–20	Silt loam	ML or CL	A–4 or A–6
Mapped only with Seaton soils.		20–50	Silt	ML	A–4
Trempealeau: 765A	>5	0–19	Loam	ML or CL	A–4 or A–6
		19–26	Sandy clay loam	SC	A–6
		26–60	Sand and fine gravel	SP or SM	A–1
*Velma: 250E, 944E2	3–5	0–17	Silt loam	ML or CL	A–4, A–6, or
For Coatsburg part of 944E2, see Coatsburg series.		17–56	Clay loam	CL	A–6 or A–7
		56–63	Loam	ML or CL	A–4 or A–6
Wabash: 83	[2]0–1	0–40	Clay	CH, OL, or OH	A–7
		40–63	Clay loam	CL or OH	A–6 or A–7
Waukee: 727A	>5	0–33	Loam	ML or CL	A–4 or A–6
		33–60	Loamy fine sand	SM	A–2

[1] Corrosivity is estimated only for the horizons in which conduits are likely to be buried.
[2] Soil subject to flooding.

properties significant in engineering

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity potential for concrete conduits[1]
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)					
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	90–100	60–75	0.6–2.0	0.20–0.22	6.1–7.3	Low.	
95–100	90–100	60–80	0.6–2.0	0.15–0.19	5.6–7.3	Moderate	Low to moderate.
95–100	90–100	55–75	0.6–2.0	0.17–0.19	7.4–8.4	Low	Low.
---	100	95–100	0.6–2.0	0.22–0.24	6.1–7.3	Low.	
---	100	95–100	0.2–2.0	0.18–0.20	5.1–6.5	Moderate to high.	Low to moderate.
---	100	85–100	0.6–2.0	0.20–0.22	5.6–7.8	Low	Low to moderate.
---	100	95–100	0.6–2.0	0.22–0.24	6.1–7.3	Low.	
---	100	90–100	0.6–2.0	0.18–0.20	5.6–7.3	Moderate	Low to moderate.
95–100	95–100	90–100	0.6–2.0	0.20–0.22	7.4–8.4	Low	Low.
---	100	95–100	0.6–2.0	0.21–0.24	6.1–7.3	Low to moderate.	
---	100	95–100	0.6–2.0	0.18–0.20	5.1–6.0	Moderate	Moderate.
---	100	95–100	0.6–2.0	0.18–0.22	6.1–8.4	Low to moderate.	Low.
100	95–100	60–80	0.6–20	0.22–0.24	5.1–7.3	Low	Low to moderate.
100	95–100	5–35	6.0–20	0.08–0.10	5.1–7.3	Low	Low to moderate.
---	100	95–100	0.6–2.0	0.22–0.24	6.1–7.8	Low.	
---	100	90–100	0.6–6.0	0.17–0.19	7.9–8.4	Low	Low.

TABLE 9.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil for referring to other series

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Atlas ---------- Mapped only with Hickory soils.	Severe: very slowly permeable; 12 to 36 inches to seasonal high water table; slope more than 12 percent.	Severe: 12 to 36 inches to seasonal high water table; slope more than 12 percent.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; slope more than 12 percent.	Severe: slope more than 12 percent; high shrink-swell potential; CH material; high potential frost action.
Atterberry: 61 -------	Severe: 12 to 36 inches to seasonal high water table.	Severe: 12 to 36 inches to seasonal high water table.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table.	Severe: 12 to 36 inches to seasonal high water table; high potential frost action.
Bloomfield ---------- Mapped only with Lamont and Tell soils.	Moderate if slope is less than 12 percent, severe if more than 12 percent.[3]	Severe: permeability is more than 6.0 inches per hour;[3] SM or SP material; slope more than 7 percent in places.	Severe: unstable sidewalls because of fine sand; slope more than 12 percent in places.	Moderate if slope is less than 12 percent, severe if more than 12 percent.
Blown-out land: 63 ---	Slight[3] ----------	Severe: permeability is more than 6.0 inches per hour;[3] SM or SP material.	Severe: unstable sidewalls because of sand.	Slight ----------
Bold ---------- Mapped only with Sylvan soils.	Severe: slope more than 18 percent.	Severe: slope more than 18 percent.	Severe: slope more than 18 percent.	Severe: slope more than 18 percent.
Borrow pit: B.P. ------ No interpretations given. Onsite determination necessary.				
*Burkhardt: 961A ---- For Saude part, see Saude series.	Slight[3] ----------	Severe: permeability is more than 2.0 inches per hour;[3] SP or SM material at a depth of 24 inches or less.	Moderate: unstable sidewalls because of sand and fine gravel at a depth of 24 inches or less.	Slight ----------
Calco: 400, W400 -----	Severe: less than 12 inches to seasonal high water table; subject to flooding.	Severe: less than 12 inches to seasonal high water table; subject to flooding; high organic-matter content.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding; high frost action.

interpretations

that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions that appear in the first column]

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Severe: 12 to 36 inches to seasonal high water table; high expanding clays.	Severe: slope more than 12 percent; high shrink-swell potential; CL or CH subgrade; highly susceptible to frost heave.	Poor: high shrink-swell potential; CL or CH material.	Unsuitable	Poor: very difficult to reestablish vegetation; slope more than 18 percent in places.
Severe: 12 to 36 inches	Severe: highly suscep-	Fair: moderate shrink-	Unsuitable	Good

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Coffeen: 428	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding; high frost action potential.
Coyne: 764A, 764C	Slight if slope is less than 4 percent, moderate if more than 4 percent.	Severe: porous material below bottom of lagoon in most places;[3] slope is more than 7 percent in places.	Slight if slope is less than 4 percent, moderate if more than 4 percent.	Slight if slope is less than 4 percent, moderate if more than 4 percent.
Cut and fill land: C.F. Material is too variable to rate. Onsite determination is necessary.				
Denny: 45	Severe: slowly permeable; less than 12 inches to seasonal high water table.	Severe: less than 12 inches to seasonal high water table.	Severe: poorly drained; less than 12 inches to seasonal high water table.	Severe: poorly drained; less than 12 inches to seasonal high water table; moderate to high shrink-swell potential; CL or CH material; high frost action potential.
Dickinson: 87A, 87C	Slight if slope is less than 4 percent, moderate if more than 4 percent.	Severe: permeability is more than 2.0 inches per hour;[3] SP or SM material below a depth of about 20 inches; slope is more than 7 percent in places.	Severe: unstable sidewalls in underlying sand.	Slight if slope is less than 4 percent, moderate if more than 4 percent.
Dorchester: 239	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Downs: 386A, 386B	Slight	Moderate: permeability is 0.6 to 2.0 inches per hour; ML or CL material.	Slight	Moderate: moderate shrink-swell potential; ML or CL material.
Elkhart: 567D2, 567E2	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Severe: slope is more than 7 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Moderate if slope is less than 12 percent; moderate shrink-swell potential; ML or CL material; severe if slope is more than 12 percent.
Fayette: 280B, 280C2, 280D2, 280D3.	Slight if slope is less than 7 percent, moderate if more than 7 percent.	Moderate if slope is less than 7 percent; permeability is 0.6 to 2.0 inches per hour; ML or CL material; severe if slope is more than 7 percent.	Slight if slope is less than 7 percent, moderate if more than 7 percent.	Moderate: moderate shrink-swell potential; ML or CL material.
Gravelly terrace escarpments: G577.	Slight[3]	Severe: permeability is more than 2 inches per hour;[6] slope is more than 7 percent.	Severe: unstable sidewalls because of coarse sand and fine gravel.	Moderate: slope is more than 7 percent.
Gravel pit: G.P. No estimate of properties.				

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[3] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: highly susceptible to frost heave; subject to flooding.	Fair: somewhat poorly drained; ML or CL material.	Unsuitable	Good.
Severe: porous material below bottom of trench in most places.[3]	Slight to a depth of 40 inches, moderate for CL material below a depth of 40 inches: moderate shrink-swell potential.	Good to a depth of 40 inches, fair for CL material below a depth of 40 inches: moderate shrink-swell potential.	Unsuitable	Good if slope is less than 4 percent, fair if more than 4 percent.
Severe: poorly drained; less than 12 inches to seasonal high water table.	Severe: poorly drained; high shrink-swell potential; CL or CH subgrade; highly susceptible to frost heave.	Poor: high shrink-swell potential; poorly drained.	Unsuitable	Poor: poorly drained.
Severe: permeability is more than 2.0 inches per hour.[3]	Slight if slope is less than 4 percent, moderate if more than 4 percent.	Good	Fair: SP or SM material below a depth of about 20 inches; unsuitable for gravel.	Good if slope is less than 4 percent, fair if more than 4 percent.
Severe: subject to flooding.	Severe: subject to flooding.	Fair: ML or CL material.	Unsuitable	Good.
Moderate: permeability is 0.6 to 2.0 inches per hour; mostly silty clay loam.	Moderate: moderate shrink-swell potential; CL subgrade.	Fair: ML or CL material; moderate shrink-swell potential.	Unsuitable	Fair: surface layer 8 to 16 inches thick.
Slight if slope is less than 12 percent, moderate if more than 12 percent.	Moderate if slope is less than 12 percent: moderate shrink-swell potential; severe if more than 12 percent.	Fair: ML or CL material; moderate shrink-swell potential in CL material.	Unsuitable	Fair: surface layer 8 to 16 inches thick.
Moderate: permeability is 0.6 to 2.0 inches per hour; mostly silty clay loam.	Moderate: moderate shrink-swell potential; CL subgrade.	Fair: ML or CL material; moderate shrink-swell potential.	Unsuitable	Fair for slightly to moderately eroded areas, poor for severely eroded areas.
Severe: permeability is more than 2.0 inches per hour.[3]	Moderate: slope is more than 7 percent.	Good	Fair: SP or SM material.	Poor: sand and fine gravel.

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
*Hickory: 8E2, 8E3, 8F, 8F3, 945E2, 945F, 945G, 946E3, 946F3, 960E2, 960E3, 960F, 960F3, 960G. For High Gap part of 945E2, 945F, and 945G, see High Gap series. For Atlas part of 946E3 and 946F3,	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Moderate if slope is less than 18 percent: clay loam; severe if slope is more than 18 percent.	Severe: slope is more than 12 percent.	Fair if slope is less than 30 percent; moderate shrink-swell potential; ML or CL material;	Unsuitable ---------	Fair if slope is less than 18 percent and moderately eroded, poor if slope is

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Lawler: 647	Severe: 12 to 36 inches to seasonal high water table.	Severe: 12 to 36 inches to seasonal high water table; permeability is more than 6.0 inches per hour in underlying sand and gravel;[3] SP or SM material below a depth of about 20 inches.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; unstable sidewalls in underlying sand and gravel.	Severe: 12 to 36 inches to seasonal high water table.
Lawson: 451	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding; high frost action potential.
Marsh: 718. Severe limitations for all uses; normal high water table.				
Martinsville: 570B, 570D3, 570E3.	Slight if slope is less than 7 percent; moderate if 7 to 12 percent; severe if more than 12 percent.	Moderate if slope is less than 7 percent: permeability is 0.6 to 2.0 inches per hour; severe if slope is more than 7 percent.	Moderate if slope is less than 12 percent: mostly clay loam; severe if slope is more than 12 percent.	Moderate: mostly ML or CL material; severe if slope is more than 12 percent.
Millington: 82, W82	Severe: less than 12 inches to seasonal high water table; subject to flooding.	Severe: less than 12 inches to seasonal high water table; subject to flooding; high organic-matter content.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding; high frost action potential.
Millsdale: 317	Severe: less than 12 inches to seasonal high	Severe: less than 12 inches to seasonal	Severe: poorly drained; less than 12 inches to	Severe: poorly drained; less than 12 inches to

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Severe: 12 to 36 inches to seasonal high water table; permeability is more than 6.0 inches per hour in underlying sand and gravel.[3]	Moderate: somewhat poorly drained; moderately susceptible to frost heave.	Fair: somewhat poorly drained.	Fair: SP or SM material below a depth of about 20 inches; 12 to 36 inches to seasonal high water table.	Good.
Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: highly susceptible to frost heave; subject to flooding.	Fair: somewhat poorly drained; ML or CL material.	Unsuitable	Good.
Moderate if slope is less than 18 percent: mostly clay loam; permeability is 0.6 to 2.0 inches per hour.	Moderate: moderate shrink-swell potential; mostly CL subgrade; severe if slope is more than 12 percent.	Fair: moderate shrink-swell potential; mostly ML or CL material.	Unsuitable	Fair for slightly eroded to moderately eroded areas; poor for severely eroded areas.
Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; subject to flooding; highly susceptible to frost heave.	Poor: poorly drained	Unsuitable	Poor: poorly drained.
Severe: poorly drained; less than 12 inches to seasonal high water table; 20 to 40 inches to limestone bedrock; mostly silty clay above bedrock.	Severe: poorly drained; 20 to 40 inches to limestone bedrock; silty clay CH layer; high shrink-swell potential.	Poor: poorly drained; silty clay CH layer; high shrink-swell potential; 20 to 40 inches to limestone bedrock.	Unsuitable	Poor: poorly drained; difficult to reestablish vegetation.
Severe: very poorly drained; less than 12 inches to seasonal high water table; silty clay or clay.	Severe: very poorly drained; CH subgrade; high shrink-swell potential.	Poor: very poorly drained; silty clay and clay CH layers; high shrink-swell potential.	Unsuitable	Poor: very poorly drained; difficult to reestablish vegetation in silty clay.
Severe: 12 to 36 inches to seasonal high water table.	Severe: highly susceptible to frost heave.	Fair: moderate shrink-swell potential; somewhat poorly drained; ML or CL material.	Unsuitable	Good.
Severe: poorly drained; less than 12 inches to seasonal high water table.	Severe: poorly drained; silty clay CH layer; high shrink-swell potential; highly susceptible to frost heave.	Poor: silty clay CH layer; high shrink-swell potential; poorly drained.	Unsuitable	Poor: poorly drained.

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Oakville: 741C, 741F	Moderate if slope is less than 12 percent, severe if more than 12 percent.[3]	Severe: permeability is more than 6.0 inches per hour; slope is more than 7 percent in places.	Severe: unstable sidewalls in fine sand; slope is more than 12 percent in places.	Moderate if slope is less than 12 percent, severe if more than 12 percent.
Orion: 415	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding; high frost action potential.
Otter: 76, W76	Severe: less than 12 inches to seasonal high water table; subject to flooding.	Severe: less than 12 inches to seasonal high water table; subject to flooding; high organic-matter content.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding; high frost action potential.
Port Byron: 277A, 277B.	Slight	Moderate: permeability is 0.6 to 2.0 inches per hour; ML or CL material; slope is 2 to 6 percent in places; high organic-matter content.	Slight	Moderate: ML or CL material.
Quarry: Qu. No estimate of properties.				
Raddle: 430A, 430B	Moderate: 36 to 60 inches to seasonal high water table.	Moderate: 36 to 60 inches to seasonal high water table; permeability is 0.6 to 2.0 inches per hour; mostly ML material; slope is 2 to 6 percent in places.	Slight: 36 to 60 inches to seasonal high water table.	Moderate: ML material
Radford: 74	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: 12 to 36 inches to seasonal high water table; subject to flooding; high frost action potential.
Rozetta: 279	Moderate: 36 to 60 inches to seasonal high water table.	Moderate: 36 to 60 inches to seasonal high water table; permeability is 0.6 to 2.0 inches per hour; ML or CL material.	Moderate: 36 to 60 inches to seasonal high water table.	Moderate: ML or CL material.
Sable: 68	Severe: less than 12 inches to seasonal high water table.	Severe: less than 12 inches to seasonal high water table; high organic-matter content.	Severe: poorly drained; less than 12 inches to seasonal high water table.	Severe: poorly drained; less than 12 inches to seasonal high water table; high shrink-swell potential; high frost action potential.
Saude: 774	Slight[3]	Severe: permeability is more than 2.0 inches per hour;[3] SP or SM material below a depth of about 24 inches.	Moderate: unstable sidewalls in underlying sand and gravel.	Slight

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Severe: permeability is more than 6.0 inches per hour;[3] slope is more than 18 percent in places.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Good if slope is less than 12 percent; fair if more than 12 percent.	Poor for sand: SM material; unsuitable for gravel.	Poor: fine sand; slope is more than 18 percent in places.
Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: highly susceptible to frost heave; subject to flooding.	Fair: somewhat poorly drained; ML or CL material.	Unsuitable	Good.
Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; subject to flooding; highly susceptible to frost heave.	Poor: poorly drained	Unsuitable	Poor: poorly drained.
Slight	Moderate: ML or CL subgrade.	Fair: ML or CL material.	Unsuitable	Good.
Slight	Moderate: ML or CL subgrade.	Fair: mostly ML material.	Unsuitable	Good.
Severe: 12 to 36 inches to seasonal high water table; subject to flooding.	Severe: highly susceptible to frost heave; subject to flooding.	Fair: somewhat poorly drained; ML or CL material.	Unsuitable	Good.
Severe: 36 to 60 inches to seasonal high water table.	Moderate: CL subgrade; moderate shrink-swell potential.	Fair: ML or CL material; moderate shrink-swell potential.	Unsuitable	Fair: surface layer 8 to 16 inches thick.
Severe: poorly drained; less than 12 inches to seasonal high water table.	Severe: poorly drained; highly susceptible to frost heave; CL or CH subgrade.	Poor: poorly drained; high shrink-swell potential; CL or CH subgrade.	Unsuitable	Poor: poorly drained.
Severe: permeability is more than 2.0 inches per hour.[3]	Slight	Good	Fair: SP or SM material below a depth of 24 inches.	Good.

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Sawmill: 107, W107	Severe: less than 12 inches to seasonal high water table; subject to flooding; moderately permeable to moderately slowly permeable.	Severe: less than 12 inches to seasonal high water table; subject to flooding; high organic-matter content.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding; high shrink-swell potential; high frost action potential.
*Seaton: 274B, 274C2, 274D2, 274E2, 942D2, 942E2, 942F2, 943D2, 943E2, 943F2. For Oakville part of 942D2, 942E2, and 942F2, see Oakville series. For Timula part of 943D2, 943E2, and 943F2, see Timula series.	Slight if slope is less than 7 percent, moderate if 7 to 12 percent, severe if more than 12 percent.	Moderate if slope is less than 7 percent: permeability is 0.6 to 2.0 inches per hour; ML or CL material; severe if slope is more than 7 percent.	Slight if slope is less than 7 percent, moderate if 7 to 12 percent, severe if more than 12 percent.	Moderate if slope is less than 12 percent: ML or CL material; severe if slope is more than 12 percent.
Seaton sandy substratum: 563B.	Slight[3]	Moderate in silt loam: permeability is 0.6 to 2.0 inches per hour; severe in underlying sand: permeability is more than 6.0 inches per hour;[3] SM or SP material.	Severe: unstable sidewalls in underlying sand.	Moderate: silt loam ML or CL material; underlying sand is SM or SP.
Sparta: 88B	Slight[3]	Severe: permeability is more than 6.0 inches per hour;[3] SM or SP material.	Severe: unstable sidewalls in sand.	Slight
*Strawn: 959G For Chute part of 959G, see Chute series.	Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.
Stronghurst: 278	Severe: 12 to 36 inches to seasonal high water table; moderately permeable to moderately slowly permeable.	Severe: 12 to 36 inches to seasonal high water table.	Severe: somewhat poorly drained; 12 to 36 inches to seasonal high water table.	Severe: 12 to 36 inches to seasonal high water table; high shrink-swell potential; high frost action potential.
*Sylvan: 19D3, 19E, 19E3, 19F, 19F3, 962F For Bold part of 962F, see Bold series.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Severe: slope is more than 7 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent: moderate shrink-swell potential; ML or CL material.
Tama: 36A, 36B, 36C2, 36D2.	Slight if slope is less than 7 percent, moderate if more than 7 percent.	Moderate if slope is less than 7 percent: ML or CL material; severe if slope is more than 7 percent; 36 to 60 inches to seasonal high water table; high organic-matter content.	Slight if slope is less than 7 percent, moderate if more than 7 percent.	Moderate: ML or CL material; moderate shrink-swell potential.
Tell Mapped only with Lamont and Bloomfield soils.	Moderate if slope is less than 12 percent, severe if more than 12 percent.[3]	Severe: permeability is more than 6.0 inches per hour in underlying loamy fine sand.[3]	Severe: unstable sidewalls in underlying loamy fine sand.	Moderate if slope is less than 12 percent, severe if more than 12 percent; silt loam ML material; underlying loamy fine sand is SM material.

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
Severe: poorly drained; less than 12 inches to seasonal high water table; subject to flooding.	Severe: poorly drained; subject to flooding; CL or CH subgrade; high shrink-swell potential; highly susceptible to frost heave.	Poor: poorly drained; CL or CH material; high shrink-swell potential.	Unsuitable	Poor: poorly drained.
Slight if slope is less than 12 percent, moderate if 12 to 18 percent, severe if more than 18 percent.	Moderate if slope is less than 12 percent: ML or CL material; severe if slope is more than 12 percent.	Fair: ML or CL material.	Unsuitable	Good if slope is less than 7 percent, fair if 7 to 18 percent, poor if more than 18 percent.
Severe: permeability below a depth of about 40 inches is more than 6.0 inches per hour.[3]	Moderate: silt loam ML or CL material; underlying fine sand is SM or SP.	Fair: silt loam ML or CL material; underlying fine sand is SM or SP.	Fair for sand: underlying fine sand is SM or SP.	Good.
Severe: permeability is more than 6.0 inches per hour.[3]	Slight	Good	Fair for sand: SM or SP material.	Poor: sand surface layer.
Severe: slope is more than 25 percent.	Severe: slope is more than 25 percent.	Poor: slope is more than 25 percent.	Unsuitable	Poor: slope is more than 25 percent.
Severe: 12 to 36 inches to seasonal high water table.	Severe: CL or CH subgrade; high shrink-swell potential; highly susceptible to frost heave.	Poor: CL or CH material; high shrink-swell potential.	Unsuitable	Fair: surface layer 8 to 16 inches thick.
Slight if slope is less than 12 percent, moderate if 12 to 18 percent, severe if more than 18 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent: ML or CL subgrade; moderate shrink-swell potential.	Fair if slope is less than 30 percent, poor if more than 30 percent: ML or CL material; moderate shrink-swell potential.	Unsuitable	Fair if slope is less than 18 percent, poor if more than 18 percent.
Moderate: permeability is 0.6 to 2.0 inches per hour; mostly silty clay loam.	Moderate: ML or CL subgrade; moderate shrink-swell potential.	Fair: ML or CL material; moderate shrink-swell potential.	Unsuitable	Good if slope is less than 7 percent, fair if more than 7 percent.
Severe: permeability is more than 6.0 inches per hour in underlying loamy fine sand.[3]	Moderate if slope is less than 12 percent, severe if more than 12 percent: ML or SM subgrade	Good if slope is less than 12 percent, fair if more than 12 percent; silt loam ML material; underlying fine sand	Poor: underlying loamy fine sand SM material; unsuitable for gravel.	Fair if slope is less than 12 percent, poor if more than 12 percent.

TABLE 9.—*Engineering*

Soil series and map symbols	Degree and kind of limitation to be considered in land-use planning—			
	Septic tank absorption fields	Sewage lagoons[1]	Shallow excavations	Dwellings without basements
Timula ---------- Mapped only with Seaton soils.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Severe: slope is more than 7 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent.	Moderate if slope is less than 12 percent, severe if more than 12 percent: ML or CL material.
Trempealeau: 765A ---	Slight[2] ----------	Severe: permeability is more than 6.0 inches per hour in underlying sand and fine gravel;[2] SP or SM material below a depth of about 20 inches.	Severe: unstable sidewalls in underlying sand and fine gravel.	Slight ----------
*Velma: 250E, 944E2 . For Coatsburg part of 944E2, see Coatsburg series.	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.	Severe: slope is more than 12 percent.
Wabash: 83 ----------	Severe: less than 12 inches to seasonal high water table; subject to flooding; very slowly permeable.	Severe: less than 12 inches to seasonal high water table; subject to flooding; high organic-matter content.	Severe: very poorly drained; less than 12 inches to seasonal high water table; subject to flooding; mainly clay.	Severe: very poorly drained; less than 12 inches to seasonal high water table; subject to flooding; high shrink-swell potential.
Waukee: 727A --------	Slight[2] ----------	Severe: permeability is more than 6.0 inches per hour in underlying loamy fine sand.[2]	Severe: unstable sidewalls in underlying loamy fine sand.	Moderate: loam ML or CL material; underlying loamy fine sand is SM material.

[1] Interpretations for lagoon floors only; for interpretations about material for embankments, see column headed "Embankments, dikes, and levees" in table 10.

[2] Onsite study is needed of the underlying strata and water table to determine the hazards of aquifer pollution and drainage into ground water in landfill deeper than 5 or 6 feet.

interpretations—Continued

Degree and kind of limitation to be considered in land-use planning—Continued		Suitability as a source of—		
Sanitary landfill[2] (trench type)	Local roads and streets	Road fill	Sand and gravel	Topsoil
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 10.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil for referring to other series

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Atlas ---------- Mapped only with Hickory soils.	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; somewhat poorly drained; slope is more than 12 percent.	Slope is 12 to 30 percent ----	Subsoil: medium to low shear strength; high compressibility; fair to poor compaction characteristics; poor workability; high shrink-swell potential. Underlying material: medium compressibility; fair to good compaction characteristics; moderate shrink-swell potential; gravel and cobblestones.
Atterberry: 61 --------	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Seasonal high water table at a depth of 12 to 36 inches; nearly level.	Subsoil: medium to low shear strength; medium compressibility; fair to good compaction characteristics; moderate shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to high susceptibility to piping; fair compaction characteristics.
Bloomfield ---------- Mapped only with Lamont and Tell soils.	Susceptible to some freezing, depending on moisture content; slope is 30 percent in places.	Rapidly permeable; high seepage potential; slope is 30 percent in places.	Sandy material; highly pervious; droughty; difficult to vegetate.
Blown-out land: 63 ----	Susceptible to freezing in some places, depending on	Rapidly permeable; high seepage potential	Sandy; highly pervious; droughty; difficult to vegetate

interpretations for specified uses

that may have different properties and limitations. For this reason it is necessary to follow carefully the instructions that appear in the first column]

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Very slowly permeable; seasonal high water table at a depth of 12 to 36 inches; slope is 12 to 30 percent.	Slope is 12 to 30 percent; slow intake rate; seasonal high water table at a depth of 12 to 36 inches; subsoil very slowly permeable; hazard of water erosion.	Slope is 12 to 30 percent	Highly erodible; somewhat poorly drained; slope is 12 to 30 percent; seedbed preparation difficult because clayey material is exposed in cuts; seepy in places.
Moderately to moderately slowly permeable; seasonal high water table at a depth of 12 to 36 inches.	Moderate intake rate; seasonal high water table at a depth of 12 to 36 inches; subsoil moderately to moderately slowly permeable.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate	Low available water capacity; slope is 4 to 30 percent; rapidly permeable; susceptible to soil blowing.	Rapidly permeable; little runoff; slope is 30 percent in places; susceptible to soil blowing; droughty; very difficult to vegetate; low available water capacity.	Sandy; subject to accumulations of windblown material; low available water capacity; slope is 30 percent in places; droughty; very difficult to vegetate.
Natural drainage is adequate	Very low available water capacity; rapidly permeable; susceptible to soil blowing.	Rapidly permeable sand with little runoff; susceptible to soil blowing; droughty; very difficult to vegetate; very low available water capacity.	Sandy; subject to accumulations of windblown material; very low available water capacity; droughty; very difficult to establish and maintain vegetation.
Natural drainage is adequate	Slope is 18 to 60 percent; highly erodible.	Slope is 18 to 60 percent	Highly erodible; slope is 18 to 60 percent; difficult to vegetate; highly susceptible to siltation in channels.
Natural drainage is adequate	Low available water capacity; moderately rapidly to rapidly permeable; sand and gravel substratum.	Rapidly permeable and little runoff; sand and gravel are exposed by cuts; droughty; difficult to vegetate; low available water capacity.	Sandy loam layer is less than 24 inches to the underlying sand and gravel; low available water capacity; droughty; very difficult to vegetate.
Seasonal high water table at a depth of less than 12 inches; moderately slowly permeable; subject to flooding; surface ponding in places.	Seasonal high water table at a depth of less than 12 inches; moderate intake rate; moderately slowly permeable below surface layer; subject to flooding; surface ponding in places.	Not needed; nearly level bottom land.	Not needed; nearly level bottom land.
Seasonal high water table at a depth of less than 12 inches.	Seasonal high water table at a depth of less than 12 inches; moderate intake rate.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate	Low available water capacity; slope is more than 25 percent; rapidly permeable; susceptible to soil blowing.	Rapidly permeable fine sand; little runoff; slope is more than 25 percent.	Sandy; subject to accumulations of windblown materials; low available water capacity; slope is more than 25 percent; droughty; difficult to vegetate.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Clayey terrace escarpments. No interpretations given. Onsite determination is necessary.			
Coatsburg ---------- Mapped only with Velma soils.	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; poorly drained; slope is more than 12 percent.	Slope is 12 to 30 percent -----	Subsoil: medium to low shear strength; high compressibility; fair to poor compaction characteristics; poor workability; high shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair to good compaction characteristics; moderate shrink-swell potential; gravel and cobblestones.
Coffeen: 428 ----------	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	High seepage potential; seasonal high water table at a depth of 12 to 36 inches; nearly level bottom lands; subject to flooding.	Medium shear strength; medium compressibility; medium to low permeability if compacted; medium susceptibility to piping; fair compaction characteristics.
Coyne: 764A, 764C ----	Susceptible to freezing depending on moisture content.	Rapidly permeable below CL material; high seepage potential; slope is 0 to 12 percent.	Subsoil: medium to low shear strength; low to medium compressibility; medium susceptibility to piping; fair compaction characteristics; medium permeability after compaction. Underlying material: medium shear strength; compacted soil highly permeable; medium to high susceptibility to piping; good compaction characteristics.
Cut and fill land: C.F. No interpretations. Material is too variable to rate. Onsite determination is necessary.			
[illegible]	Surface layer and upper part [illegible]	Seasonal high water table at [illegible]	Subsoil: medium to low shear strength; [illegible]

for specified uses—Continued

Soil features affecting—Continued			
Drainage for	Irrigation	Terraces and diversions	Grassed waterways

TABLE 10.—*Engineering interpretations*

Soil series	Soil features affecting—

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Natural drainage is adequate.	Slope is 0 to 6 percent; moderate intake rate; susceptible to water erosion.	Silty clay loam subsoil exposed by cuts; susceptible to siltation in channels.	Susceptible to water erosion; silty clay loam subsoil exposed by deep cuts; subject to siltation in channels.
Natural drainage is adequate.	Slope is 7 to 18 percent; moderate intake rate; highly susceptible to water erosion.	Slope is 7 to 18 percent; silty clay loam subsoil exposed by cuts; in many cuts the highly erosive silty substratum also exposed and difficult to vegetate; susceptible to siltation in channels.	Highly erodible; slope is 7 to 18 percent; silty clay loam subsoil exposed by cuts; in many cuts the highly erodible silty substratum also exposed and difficult to vegetate; susceptible to siltation in channels.
Natural drainage is adequate.	Slope is mainly 2 to 12 percent, but is more than 12 percent in places; moderate to slow intake rate; highly susceptible to water erosion.	Slope is mainly 2 to 12 percent, but is more than 12 percent in places; silty clay loam exposed by deep cuts; susceptible to siltation in channels.	Highly erodible; slope is more than 12 percent in places; silty clay loam subsoil exposed by deep cuts; susceptible to siltation in channels.
Natural drainage is adequate.	Very low available water capacity; slope is more than 7 percent; sand and gravel rapidly permeable.	Sand and gravel rapidly permeable and little runoff; droughty; very difficult to vegetate; very low available water capacity; slopes are very short and more than 7 percent.	Sand and gravel; very low available water capacity; droughty; very difficult to vegetate.
Natural drainage is adequate.	Slope is mainly 12 to 30 percent, but is 60 percent in places; moderate to slow intake rate; highly susceptible to water erosion.	Slope is mainly 12 to 30 percent, but is 60 percent in places.	Highly erodible; slope is mainly 12 to 30 percent, but is 60 in places; clay loam subsoil and gravel and cobblestones exposed by cuts; difficult to vegetate.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
High Gap. Mapped only with Hickory soils.	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; slope is 12 to 60 percent.	Slope is 12 to 60 percent	Subsoil: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair to good compaction characteristics; moderate shrink-swell potential. Underlying material: medium to low shear strength; high compressibility; fair to poor compaction characteristics; high shrink-swell potential; poor workability.
Hitt variant: V506A	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material.	Limestone bedrock at a depth of 20 to 40 inches; high seepage potential; slope is 0 to 4 percent.	Subsoil: limited volume of material; medium to low shear strength; low to medium compressibility; medium susceptibility to piping; fair to good compaction characteristics; moderate shrink-swell potential. Underlying material: limestone bedrock at a depth of 20 to 40 inches.
Hoopeston: 172	Susceptible to freezing, depending on moisture content; somewhat poorly drained.	Rapidly permeable; high seepage potential; seasonal high water table at a depth of 12 to 36 inches; nearly level.	Sandy; medium shear strength; low to medium compressibility; low to medium permeability after compaction; medium susceptibility to piping; fair compaction characteristics.
Joslin: 763A, 763B	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material.	Moderate seepage potential below silty clay layer; slope is 0 to 6 percent.	Upper silty part of subsoil: medium to low shear strength; medium compressibility; medium to high susceptibility to piping; fair compaction characteristics; medium to low permeability after compaction. Lower, clayey part of subsoil: medium to low shear strength; high compressibility; fair to poor compaction characteristics; high shrink-swell potential.
Joy: 275	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Seasonal high water table at a depth of 12 to 36 inches; moderate seepage potential; nearly level; high organic-matter content in surface layer.	Medium to low shear strength; medium to high compressibility; medium to high susceptibility to piping; fair compaction characteristics; medium to low permeability after compaction; high organic-matter content in surface layer.
*Lamont: 947C2, 947F2. For Tell part of 947C2 and 947F2, see Tell series. For Bloomfield part of 947C2 and 974F2, see Bloomfield series.	Susceptible to freezing, depending on moisture content; slope is 30 percent in places.	Rapidly permeable; high seepage potential; slope is 4 to 30 percent.	Fine sandy loam layer; medium shear strength; low to medium compressibility; medium to low permeability after compaction; high susceptibility to piping; fair compaction characteristics. Underlying material: highly permeable after compaction.
Landes: 304	Susceptible to freezing, depending on moisture content.	Rapidly permeable; high seepage potential; slope is 0 to 4 percent; subject to flooding.	Medium shear strength; low to medium compressibility; medium to high permeability after compaction; medium to high susceptibility to piping; good compaction characteristics.
Lawler: 647	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Underlying material rapidly permeable; rapid seepage rate; seasonal high water table at a depth of 12 to 36 inches; nearly level.	Subsoil: limited material; medium to low shear strength; medium compressibility; low permeability after compaction; medium to low susceptibility to piping; fair compaction characteristics; moderate shrink-swell potential. Underlying material: rapidly permeable after compaction.

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Natural drainage is adequate.	Silty clay shale at a depth of 20 to 40 inches; slope is 12 to 60 percent; moderate intake rate.	Slope is 12 to 60 percent	Highly erodible; slope is 12 to 60 percent; clay loam subsoil or clayey shale underlying material exposed by cuts; difficult to vegetate shaley material; seepy in places.
Natural drainage is adequate.	Moderate available water capacity; limestone bedrock at a depth of 20 to 40 inches; moderate intake rate.	Subsoil or underlying limestone bedrock exposed by cuts; difficult to vegetate.	Subsoil or underlying limestone bedrock exposed by cuts; moderate available water capacity; difficult to vegetate.
Sandy; seasonal high water table at a depth of 12 to 36 inches; unstable ditchbanks.	Low available water capacity; seasonal high water table at a depth of 12 to 36 inches.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate.	Slope is 0 to 7 percent; moderate intake rate; moderately slowly permeable underlying silty clay.	Deep cuts expose silty clay between depths of 40 and 60 inches; silty clay layer is difficult to work and vegetate.	Deep cuts expose silty clay between depths of 40 and 60 inches; silty clay layer is difficult to work and vegetate.
Seasonal high water table at a depth of 12 to 36 inches.	Moderate intake rate; seasonal high water table at a depth of 12 to 36 inches.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate.	Low to moderate available water capacity; slope is 4 to 30 percent; susceptible to soil blowing.	Rapidly permeable; fine sandy loam and little runoff; loose sand exposed by cuts; slope is 30 percent in places; susceptible to soil blowing; droughty; difficult to vegetate; low to moderate available water capacity.	Sandy; subject to accumulation of windblown material; slope is 4 to 30 percent; low to moderate available water capacity; droughty; difficult to vegetate.
Natural drainage is adequate, but subject to flooding.	Moderate to low available water capacity; subject to flooding; susceptible to soil blowing.	Not needed: porous sand; nearly level to gently sloping bottom land.	Not needed: porous sand; nearly level to gently sloping bottom land.
Seasonal high water table at a depth of 12 to 36 inches; sand and gravel at a depth of 20 to 40 inches; unstable ditchbanks.	Moderate available water capacity; seasonal high water table at a depth of 12 to 36 inches.	Not needed; nearly level	Not needed; nearly level.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Lawson: 451	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; somewhat poorly drained	Moderate seepage potential; seasonal high water table at a depth of 12 to 36 inches; nearly level bottom land; subject to flooding	Medium to low shear strength; medium to high compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Seasonal high water table at a depth of 12 to 36 inches; subject to flooding.	Moderate intake rate; seasonal high water table at a depth of 12 to 36	Not needed; nearly level bottom land.	Not needed: nearly level bottom land.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Niota: 261	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; poorly drained.	Seasonal high water table at a depth of less than 12 inches; nearly level.	Subsoil: medium to low shear strength; high to medium compressibility; fair compaction characteristics; high shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to high susceptibility to piping; fair compaction characteristics.
Oakville: 741C, 741F	Susceptible to freezing, depending on moisture content; slope is 2 to 60 percent.	Rapidly permeable; high seepage potential; slope is 60 percent in places.	Sandy; highly pervious; droughty; difficult to vegetate.
Orion: 415	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Moderate seepage potential; seasonal high water table at a depth of 12 to 36 inches; nearly level bottom lands; subject to flooding.	Medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.
Otter: 76, W76	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; poorly drained.	Seasonal high water table at a depth of less than 12 inches; nearly level bottom lands; high organic-matter content in upper 2 to 3 feet; subject to flooding; susceptible to seepage.	Medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics; high organic-matter content in upper 2 to 3 feet.
Port Byron: 277A, 277B	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material.	Moderate seepage potential; slope is 0 to 6 percent; moderate organic-matter content in surface layer.	Medium to low shear strength; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics; moderate organic-matter content in surface layer.
Quarry: Qu. No interpretations.			
Raddle: 430A, 430B	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material.	Moderate seepage potential; slope is 0 to 6 percent.	Medium to low shear strength; low to medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.
Radford: 74	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Seasonal high water table at a depth of 12 to 36 inches; nearly level bottom land; subject to flooding.	Silt loam: medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics. Underlying material: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair compaction characteristics; moderate shrink-swell potential.
Rozetta: 279	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material.	Seasonal high water table at a depth of 36 to 60 inches; nearly level.	Subsoil: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair compaction characteristics; moderate shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Slowly permeable; seasonal high water table at a depth of less than 12 inches.	Slow intake rate; seasonal high water table at a depth of less than 12 inches; subsoil slowly permeable.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate.	Very low to low available water capacity; slope is 2 to 60 percent; very rapidly permeable; susceptible to soil blowing.	Rapidly permeable fine sand; little runoff; slope is 60 percent in places; susceptible to soil blowing; difficult to vegetate; very low to low available water capacity.	Sandy; accumulation of wind-blown material; very low to low available water capacity; slope is 60 percent in places; droughty; very difficult to vegetate.
Seasonal high water table at a depth of 12 to 36 inches;	Moderate intake rate; seasonal high water table	Not needed; nearly level bottom land.	Not needed; nearly level bottom land.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Sable: 68	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; poorly drained.	Seasonal high water table at a depth of less than 12 inches; nearly level; high organic-matter content in surface layer.	Subsoil: medium to low shear strength; medium to high compressibility; low to medium susceptibility to piping; fair compaction characteristics; high shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to high susceptibility to piping; fair compaction characteristics.
Saude: 774	Susceptible to freezing, depending on moisture content.	Rapidly permeable; high seepage potential.	Loam: limited material; medium shear strength; low to medium compressibility; medium to low permeability after compaction; high susceptibility to piping; fair compaction characteristics. Underlying material: high permeability after compaction.
Sawmill: 107, W107	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact material; poorly drained.	Seasonal high water table at a depth of less than 12 inches; nearly level bottom lands; high organic-matter content in upper 2 to 3 feet; subject to flooding.	Medium to low shear strength; medium to high compressibility; fair compaction characteristics; high shrink-swell potential; high organic-matter content in upper 2 to 3 feet.
*Seaton: 274B, 274C2, 274D2, 274E2, 942D2, 942E2, 942F2, 943D2, 943E2, 943F2. For Oakville part of 942D2, 942E2, and 942F2, see Oakville series. For Timula part of 943D2, 943E2, and 943F2, see Timula series.	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; slope is 30 percent in places.	Moderate seepage potential; slope is mainly 2 to 18 percent, but is 30 percent in places.	Medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.
Seaton sandy substratum: 563B.	Surface layer and upper part of subsoil freeze hard;	Underlying material rapidly permeable; rapid seepage	Subsoil: limited volume; medium to low shear strength; medium compressi-

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Seasonal high water table at a depth of less than 12 inches.	Moderate intake rate; seasonal high water table at a depth of less than 12 inches.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate	Moderate available water capacity; moderate intake rate; subsoil moderately rapidly permeable; sand and gravel underlying material.	Not needed; nearly level	Not needed; nearly level.
Seasonal high water table at a depth of less than 12 inches; subject to flooding; surface ponding in places.	Moderate intake rate; seasonal high water table at a depth of less than 12 inches; subject to flooding; surface ponding in places.	Not needed; nearly level bottom land.	Not needed; nearly level bottom land.
Natural drainage is adequate	Slope is mainly 2 to 18 percent, but is 30 percent in places; moderate intake rate; susceptible to water erosion.	Slope is mainly 2 to 18 percent, but is 30 percent in places; susceptible to channel siltation.	Highly erodible; slope is 30 percent in places; susceptible to channel siltation.
Natural drainage is adequate	Slope is 2 to 7 percent; moderate intake rate; susceptible to water erosion.	Susceptible to siltation in channels.	Susceptible to water erosion; subject to siltation in channels.
Natural drainage is adequate	Very low available water capacity; very rapidly permeable; susceptible to soil blowing; slope is 0 to 6 percent.	Sand rapidly permeable; little runoff; susceptible to soil blowing; droughty; very difficult to vegetate; very low available water capacity.	Sandy material; accumulation of wind blown material; very low available water capacity; droughty; very difficult to vegetate.
Natural drainage is adequate	Moderate to high available water capacity; slope is more than 25 percent; moderate intake rate; high susceptibility to water	Slope is more than 25 percent.	Highly erodible; slope is more than 25 percent; stones and boulders exposed by cuts; difficult to vegetate.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
Stronghurst: 278	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; somewhat poorly drained.	Seasonal high water table at a depth of 12 to 36 inches; nearly level.	Subsoil: medium to low shear strength; medium to high compressibility; fair compaction characteristics; moderate to high shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.
*Sylvan: 19D3, 19E, 19E3, 19F, 19F3, 962F. For Bold part of 962F, see Bold series.	Surface layer and subsoil freeze hard; difficult to excavate frozen soil and compact material; slope is mainly 7 to 30 percent, but is more than 30 percent in places.	Moderate seepage potential in underlying material; slope is mainly 7 to 30 percent, but is more than 30 percent in places.	Subsoil: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair to good compaction characteristics; moderate shrink-swell potential. Underlying material: medium to low shear strength; medium compressibility; medium to low permeability after compaction; medium to high susceptibility to piping; fair compaction characteristics.
Terre: 26A, 26B, 26C2	Surface layer and subsoil	Slope is 0 to 12 percent;	Subsoil: medium to low shear strength;

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderately to moderately slowly permeable; seasonal high water table at a depth of 12 to 36 inches.	Moderate intake rate; seasonal high water table at a depth of 12 to 36 inches; moderately to moderately slowly permeable.	Not needed; nearly level	Not needed; nearly level.
Natural drainage is adequate	Slope is mainly 7 to 30 percent, but is more than 30 percent in places; moderate to slow intake rate; high susceptibility to water erosion.	Slope is mainly 7 to 30 percent, but is more than 30 percent in places; silty clay loam subsoil is exposed by cuts; highly erodible silty substratum is also exposed in many cuts and is difficult to vegetate; susceptible to siltation in channels.	Highly erodible; slope is mainly 7 to 30 percent, but is more than 30 percent in places; silty clay loam subsoil is exposed by cuts; highly erodible silty substratum is also exposed in many cuts and is difficult to vegetate; susceptible to siltation in channels.
Natural drainage is adequate	Slope is 0 to 12 percent;	Susceptible to siltation in	Susceptible to water erosion

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Soil features affecting—		
	Winter grading	Pond reservoir areas	Embankments, dikes, and levees
*Velma: 250E, 944E2 -- For Coatsburg part of 944E2, see Coatsburg series.	Surface layer and upper part of subsoil freeze hard; difficult to excavate frozen soil and compact material; slope is 12 to 18 percent.	Slope is 12 to 18 percent ----	Subsoil: medium to low shear strength; medium compressibility; low to medium susceptibility to piping; fair to good compaction characteristics; moderate shrink-swell potential; some gravel. Underlying material: medium to low shear strength; medium compressibility; medium to high susceptibility to piping; fair compaction characteristics; gravel and cobblestones; medium to low permeability after compaction.
Wabash: 83 ----------	Upper 2 to 3 feet freezes hard; difficult to excavate frozen soil and compact	Seasonal high water table at a depth of less than 12 inches; nearly level bottom	Medium to low shear strength; high to medium compressibility; fair compaction characteristics; high organic-

for specified uses—Continued

Soil features affecting—Continued			
Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Natural drainage is adequate	Slope is 12 to 18 percent; moderate intake rate; high susceptibility to water erosion.	Slope is 12 to 18 percent	Highly erodible; slope is 12 to 18 percent; clay loam subsoil, gravel, and cobblestones are exposed by cuts; difficult to vegetate.
Very slowly permeable; seasonal high water table at a depth of less than 12 inches; subject to flooding.	Slow to moderate intake rate; seasonal high water table at depth of less than 12 inches; subsoil very slowly permeable; subject to flooding.	Not needed; nearly level bottom land.	Not needed; nearly level bottom land.
Natural drainage is adequate	Moderate available water capacity; moderate intake rate; substratum rapidly permeable.	Rapidly permeable; little runoff; sandy material is exposed by deep cuts; droughty; moderate available water capacity.	Surface layer and subsoil are less than 40 inches to underlying sand; moderate available water capacity; somewhat droughty.

TABLE 11.—

[Tests performed by Illinois Department of

Soil name and location	Parent material	Report 72-IL-081	Depth	Moisture density[1]		Mechanical analysis[2]	
				Maximum dry density	Optimum moisture	Percentage passing sieve— ¾ in	⅜ in
			Inches	*Lb per cu ft*	*Percent*		
Atlas silt loam: 240 feet north and 35 feet east of southwest corner sec. 33, T. 16 N., R. 2 W. (modal)	Loess over relic gleyed paleosol.	1-1	0-5	102	19	-----	-----
		1-2	20-25	103	19	-----	-----
		1-3	35-46	108	16	-----	-----
Coatsburg silt loam: 481 feet north of gate center and 53 feet east in the northwest corner of NW¼SE¼SE¼ sec. 34, T. 16 N., R. 3 W. (modal)	Loess over gleyed Sangamon paleosol; oxidized Illinoian till.	2-1	0-6	97	21	-----	-----
		2-2	18-30	100	19	-----	100
		2-3	54-72	115	15	-----	100
Denny silt loam: 171 feet north of west corner of east-west fence, and 128 feet east of road fence in the southwest corner of SW¼SW¼NW¼ sec. 20, T. 16 N., R. 2 W. (nonmodal—does not have abrupt textural change between the A2 and B21tg horizons.)	Loess.	3-1	0-9	98	21	-----	-----
		3-2	9-14	106	18	-----	-----
		3-3	25-44	99	21	-----	-----
		3-4	58-61	110	16	-----	-----
Hickory silt loam: 138 feet north of center of old lane; 70 feet west of centerline of Illinois Route No. 92 in SE¼NE¼SW¼ sec. 35, T. 17 N., R. 4 W. (modal)	Loess over glacial till.	4-1	3-7	113	14	-----	-----
		4-2	23-27	106	18	-----	100
		4-3	48-58	123	12	[4] 98	97
High Gap silt loam: 100 feet north along Illinois Route No. 92 at crest of west road bank, from center of gate to BSA property in the southeast corner of SE¼NE¼SW¼ sec. 35, T. 17 N., R. 4 W. (modal)	Illinoian till over Pennsylvanian clay shale.	5-1	4-7	116	16	100	99
		5-2	21-28	111	16	[5] 99	99
		5-3	37-55	110	18	-----	-----
Montgomery silty clay loam: 175 feet south of east-west fence line and 23 feet east of north-south fence in the northwest corner of the NW¼NW¼ sec. 29, T. 17 N., R. 2 W. (nonmodal—B horizon below depth of 40 inches formed by red clay sediments.)	Lacustrine sediments.	6-1	0-8	89	25	-----	-----
		6-2	34-46	102	22	-----	-----
		6-3	56-64	87	31	-----	-----
		6-4	64-74	116	17	-----	-----
Niota silt loam: 43 feet southwest along centerline of road from a point in line with center of field gate and 143 feet northwest and perpendicular to centerline of Illinois Highway 2 in the northwest corner of the SW¼SE¼SW¼ sec. 30, T. 19 N., R. 3 E. (modal)	Loess with lacustrine material underneath.	7-1	7-14	105	20	-----	-----
		7-2	14-24	89	31	-----	-----
		7-3	24-33	101	20	-----	-----
		7-4	53-60	105	20	-----	-----

Engineering test data

Transportation, Bureau of Materials, Springfield]

Mechanical analysis[2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO[3]	Unified
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
								Percent			
-----	100	99	95	94	71	30	19	40	18	A-6(18)	CL
----	100	96	79	78	69	40	33	47	30	A-7-6(23)	CL
-----	100	96	78	78	68	45	39	44	27	A-7-6(21)	CL
-----	100	99	94	89	71	34	24	45	19	A-7-6(21)	CL
99	99	95	78	74	66	54	46	53	35	A-7-6(27)	CH
99	98	93	71	66	53	35	31	39	23	A-6(15)	CL
-----	-----	100	99	92	67	36	22	38	13	A-6(15)	ML
-----	-----	-----	100	97	69	26	19	32	10	A-4(10)	CL
-----	-----	-----	100	88	63	36	26	52	31	A-7-6(35)	CH
-----	-----	-----	100	84	55	18	13	35	14	A-6(14)	CL
-----	100	99	93	91	71	28	24	30	10	A-4(9)	CL
99	98	92	57	54	50	48	46	49	29	A-7-6(6)	CL
96	94	88	57	55	52	30	26	30	16	A-6(7)	CL
98	97	93	74	68	54	19	14	21	2	A-4(0)	CL
98	97	91	66	66	62	47	41	44	28	A-7-6(16)	CL
-----	100	96	92	90	82	60	39	46	23	A-7-6(23)	CL
-----	100	99	96	92	78	46	33	61	32	A-7-6(37)	CH
-----	100	98	94	91	78	51	44	64	44	A-7-6(46)	CH
-----	100	100	98	97	94	86	72	88	57	A-7-5(67)	CH
-----	100	100	100	97	85	51	42	43	25	A-7-6(26)	CL
-----	100	98	95	91	82	46	33	35	12	A-6(12)	CL
-----	100	100	99	94	82	70	63	76	40	A-7-5(49)	OH
-----	100	100	99	93	90	39	33	50	23	A-7-6(27)	CH
-----	100	100	99	95	66	39	33	49	30	A-7-6(32)	CL

TABLE 11.—*Engineering*

[Tests performed by Illinois Department of

Soil name and location	Parent material	Report 72-IL-081	Depth	Moisture density[1]		Mechanical analysis[2]	
				Maximum dry density	Optimum moisture	Percentage passing sieve—	
						¾ in	⅜ in
			Inches	*Lb per cu ft*	*Percent*		
Otter silt loam: 25 feet west and 270 feet south of gate in east-west fence in the southeast corner of NW¼SW¼ SW¼ sec. 31, T. 17 N., R. 5 W. (modal)	Mississippi flood plain and bottom land.	8-1	7-19	107	18	-----	-----
		8-2	31-40	111	18	-----	-----
Stronghurst silt loam: 160 feet south of road fence along east side of orchard lane, then 47 feet east in the southwest corner of SW¼SW¼NE¼ sec. 17, T. 18 N., R. 1 E. (modal)	Loess.	9-1	0-10	106	17	-----	-----
		9-2	21-29	103	21	-----	-----
		9-3	51-60	110	17	-----	-----
Sylvan silt loam: 177 feet north of corner of east-west fence and northeast-southeast fence in the northeast corner of SW¼NW¼SE¼ sec. 29, T. 17 N., R. 2 W. (modal)	Loess.	10-1	0-6	99	19	-----	-----
		10-2	6-15	108	17	-----	-----
		10-3	30-60	114	14	-----	-----
Velma silt loam: 481 feet north of gate center and 26 feet east in the northwest corner of [illegible]	Calcareous till.	11-1	0-8	97	22	-----	-----
		11-2	22-33	112	16	[5] 99	99
		11-3	56-63	120	13	[6] 95	94

test data—Continued

Transportation, Bureau of Materials, Springfield]

Mechanical analysis[2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO[3]	Unified
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
								Percent			
-----	100	100	72	68	64	46	40	43	23	A-7-6(15)	CL
-----	100	100	63	58	49	41	38	36	19	A-6(9)	CL
-----	100	99	95	89	49	12	5	32	9	A-4(9)	CL
-----	100	99	98	97	70	38	28	55	35	A-7-6(38)	CH
-----	100	100	88	78	53	28	21	37	17	A-6(15)	CL
-----	100	100	95	88	36	22	17	40	15	A-6(16)	CL
-----	100	100	95	92	40	28	24	38	19	A-6(19)	CL
-----	100	100	94	78	23	12	9	25	4	A-4(3)	CL-ML
-----	100	98	85	67	54	30	23	47	19	A-7-6(18)	ML

Medium and moderately fine textured soils formed in alluvium in the Mississippi and Rock River Valleys. Soils such as the Coffeen and Sawmill soils commonly occupy those river valleys. In the smaller valleys, soils are usually more strongly developed or have greater horizon differentiation.

Most of the soils on uplands are moderately developed. The soils in the western and northern parts of

TABLE 12.—*Soils classified according to the current system of classification*

Soil series	Family	Subgroup	Order
Atlas	Fine, montmorillonitic, mesic, sloping	Aeric Ochraqualfs	Alfisols.
Atterberry	Fine-silty, mixed, mesic	Udollic Ochraqualfs	Alfisols.
Bloomfield	Coarse-loamy, mixed, mesic	Psammentic Hapludalfs	Alfisols.
Bold	Coarse-silty, mixed (calcareous), mesic	Typic Udorthents	Entisols.
Burkhardt	Sandy, mixed, mesic	Typic Hapludolls	Mollisols.
Calco	Fine-silty, mixed (calcareous), mesic	Cumulic Haplaquolls	Mollisols.
Canisteo	Fine-loamy, mixed (calcareous), mesic	Typic Haplaquolls	Mollisols.
Chute	Mixed, mesic	Typic Udipsamments	Entisols.
Coatsburg	Fine, montmorillonitic, mesic, sloping	Typic Argiaquolls	Mollisols.
Coffeen	Coarse-silty, mixed, mesic	Fluvaquentic Hapludolls	Mollisols.
Coyne	Coarse-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Denny[1]	Fine, montmorillonitic, mesic	Mollic Albaqualfs	Alfisols.
Dickinson	Coarse-loamy, mixed, mesic	Typic Hapludolls	Mollisols.
Dorchester	Fine-silty, mixed (calcareous), mesic	Typic Udifluvents	Entisols.
Downs	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Elkhart	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Fayette	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Hickory	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
High Gap[2]	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Hitt variant	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Hoopeston	Coarse-loamy, mixed, mesic	Aquic Hapludolls	Mollisols.
Joslin	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Joy	Fine-silty, mixed, mesic	Aquic Hapludolls	Mollisols.
Lamont	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Landes[3]	Coarse-loamy, mixed, mesic	Fluventic Hapludolls	Mollisols.
Lawler	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Aquic Hapludolls	Mollisols.
Lawson	Fine-silty, mixed, mesic	Cumulic Hapludolls	Mollisols.
Martinsville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Millington	Fine-loamy, mixed (calcareous), mesic	Cumulic Haplaquolls	Mollisols.
Millsdale	Fine, mixed, mesic	Typic Argiaquolls	Mollisols.
Montgomery[4]	Fine, mixed, mesic	Typic Haplaquolls	Mollisols.
Muscatine	Fine-silty, mixed, mesic	Aquic Hapludolls	Mollisols.
Niota	Fine, mixed, mesic	Mollic Albaqualfs	Alfisols.
Oakville	Mixed, mesic	Typic Udipsamments	Entisols.
Orion	Coarse-silty, mixed, nonacid, mesic	Aquic Udifluvents	Entisols.
Otter	Fine-silty, mixed, mesic	Cumulic Haplaquolls	Mollisols.
Port Byron	Fine-silty, mixed, mesic	Typic Hapludolls	Mollisols.
Raddle	Fine-silty, mixed, mesic	Typic Hapludolls	Mollisols.
Radford	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols.
Rozetta	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Sable	Fine-silty, mixed, mesic	Typic Haplaquolls	Mollisols.
Saude	Coarse-loamy over sandy or sandy skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Sawmill	Fine-silty, mixed, mesic	Cumulic Haplaquolls	Mollisols.
Seaton	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Sparta	Sandy, mixed, mesic	Entic Hapludolls	Mollisols.
Strawn	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Stronghrust	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols.
Sylvan	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Tama	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Tell[5]	Fine-silty over sandy or sandy skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Timula	Coarse-silty, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Trempealeau	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Velma	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Wabash	Fine, montmorillonitic, mesic	Vertic Haplaquolls	Mollisols.
Waukee	Fine-loamy over sandy or sandy skeletal, mixed, mesic	Typic Hapludolls	Mollisols.

[1] Denny soils are taxadjuncts to the series because they lack an abrupt textural change.

[2] High Gap soils are taxadjuncts to the series because they have high pH in the lower part of the B horizon and the C horizon.

[3] Landes soils are taxadjuncts to the series because they are stratified in the horizon underlying the mollic epipedon.

[4] Montgomery soils are taxadjuncts to the series because the lower part of the B horizon formed in red clay sediments.

[5] Tell soils are taxadjuncts to the series because the sand content is high in the upper part of the profile.

grass vegetation. They have a thick, dark surface layer called the mollic epipedon. Alfisols are soils that have clay-enriched B horizons that are high in base saturation. Entisols are most mineral soils that do not have [illegible] properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences resulting from the climate

tween great groups are those in which clay, iron, or humus have accumulated or those that have pans that interfere with growth of roots or movement of water. The features used are the self-mulching properties of clay, soil temperature, chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like.

SUBGROUP.—Great groups are subdivided into subgroups. One represents the central (typic) segment of the group and others, called intergrades, have properties of one great group and also have one or more properties of another great group, suborder, or order. Subgroups may also be made in instances where soil properties intergrade outside the range of any other great group, suborder, or order.

FAMILY.—Families are established within a subgroup primarily on the basis of properties that affect the growth of plants or behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

SERIES.—The series is a group of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and arrangement in the profile.

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(1) American Association of State Highway Officials. 1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus.

(2) Broadfoot, W. M. 1960. Field guide for evaluating cottonwood sites. U.S. Dept. Agr. South. Forest Expt. Sta., Occas. Paper 178, 6 pp., illus.

(3) Huff, F. A., and Changnon, S. A. 1959. Hail climatology of Illinois. Ill. State Water Survey, Rpt. of Invest. No. 38, 46 pp.

(4) [illegible] 1960. [illegible] in Illinois. Ill. Agr. [illegible]

Glossary

Acidity. See Reaction, soil.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bottom land. Nearly level land on the bottom of a valley that has a stream flowing through it; subject to flooding and often referred to as a flood plain.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specific plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from crop fields.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath

Organic-matter content. Ratings used in this survey are as follows:

Low	Below 2 percent of volume
Moderate	2 to 4 percent
High	More than 4 percent

Percent slope. The slant or gradient of a slope stated in percent; for example, a slope of 10 percent is one that changes 10 feet in elevation for each 100 feet horizontal distance.

Percolation, soil-water. The downward movement of water through soil, especially the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of the order of 1.0 or less.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

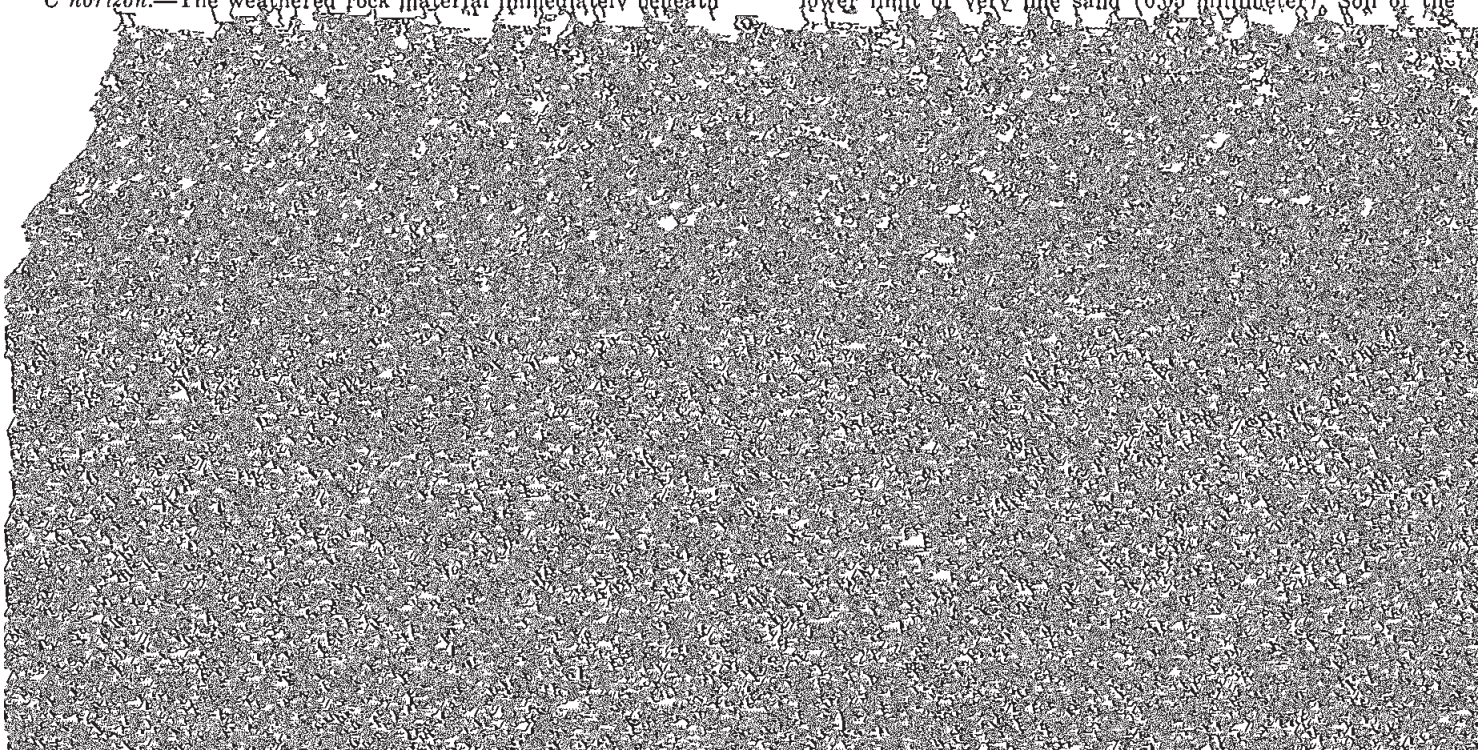
Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the



Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Variant, soil. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 3, page 11.
Predicted yields, table 4, page 70.
Woodland, table 5, page 72.
Recreation, table 7, page 86.
Engineering, tables 8, 9, 10, and 11, pages 90 to 135.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group
			Symbol	Page	Symbol	Number	Number
8E2	Hickory silt loam, 12 to 18 percent slopes, eroded	26	IVe-1	65	1r2	2	4
8E3	Hickory soils, 12 to 18 percent slopes, severely eroded	26	VIe-1	66	1r2	2	4
8F	Hickory silt loam, 18 to 30 percent slopes	26	VIe-1	66	1r2	3	4
8F3	Hickory soils, 18 to 30 percent slopes, severely eroded	27	VIe-1	66	1r2	3	4
19D3	Sylvan soils, 7 to 12 percent slopes, severely eroded	55	IVe-1	65	2o1	1	3
19E	Sylvan silt loam, 12 to 18 percent slopes	55	IVe-1	65	2r2	2	4
19E3	Sylvan soils, 12 to 18 percent slopes, severely eroded	55	VIe-1	66	2r2	2	4
19F	Sylvan silt loam, 18 to 30 percent slopes	55	VIe-1	66	2r2	3	4
19F3	Sylvan soils, 18 to 30 percent slopes, severely eroded	55	VIe-1	66	2r2	3	4
36A	Tama silt loam, 0 to 2 percent slopes	57	I-1	62	1o1	1	1
36B	Tama silt loam, 2 to 6 percent slopes	57	IIe-1	63	1o1	1	1
36C2	Tama silt loam, 4 to 7 percent slopes, eroded	57	IIe-1	63	1o1	1	1
36D2	Tama silt loam, 7 to 12 percent slopes,						

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group
			Symbol	Page	Symbol	Number	Number
278	Stronghurst silt loam	54	IIw-1	63	3o1	4	5
279	Rozetta silt loam	47	I-1	62	2o1	1	1
280B	Fayette silt loam, 2 to 6 percent slopes	24	IIe-1	63	2o1	1	1
280C2	Fayette silt loam, 4 to 7 percent slopes, eroded	24	IIe-1	63	2o1	1	1
280D2	Fayette silt loam, 7 to 12 percent slopes, eroded	24	IIIe-1	64	2o1	1	3
280D3	Fayette soils, 7 to 12 percent slopes, severely eroded	25	IVe-1	65	2o1	1	3
304	Landes loamy fine sand	35	IVs-1	65	2o4	5	6
317	Millsdale silty clay loam	39	IIIw-1	65	2w3	6	7
347	Canisteo silt loam	16	IIw-1	63	2w3	6	7
386A	Downs silt loam, 0 to 2 percent slopes	22	I-1	62	2o1	1	1
386B	Downs silt loam, 2 to 6 percent slopes	22	IIe-1	63	2o1	1	1
400	Calco silty clay loam	15	IIw-2	63	2w5	6	8
W400	Calco silty clay loam, wet	15	Vw	66	2w5	6	8
415	Orion silt loam	43	I-3	63	2o4	5	6
428	Coffeen silt loam	18	I-3	63	2o4	5	6
430A	Raddle silt loam, 0 to 2 percent slopes	45	I-1	62	1o1	1	1
430B	Raddle silt loam, 2 to 6 percent slopes	45	IIe-1	63	1o1	1	1
451	Lawson silt loam	36	I-3	63	2o4	5	6
455	Mixed alluvial land	39	IIIw-2	65	2o4	5	6
465	Montgomery silty clay loam	40	IIIw-1	65	2w6	6	7
V506A	Hitt loam, shallow variant, 0 to 4 percent slopes	31	IIs-1	63	3o1	1	1
563B	Seaton silt loam, sandy substratum, 2 to 6 percent slopes	52	IIe-1	63	2o1	1	1
567D2	Elkhart silt loam, 7 to 12 percent slopes, eroded	23	IIIe-1	64	1o1	1	3
567E2	Elkhart silt loam, 12 to 18 percent slopes, eroded	23	IVe-1	65	2r2	2	4
570B	Martinsville silt loam, 2 to 7 percent slopes	37	IIe-1	63	2o1	1	1
570D3	Martinsville soils, 7 to 12 percent slopes, severely eroded	37	IVe-1	65	2o1	1	3
570E3	Martinsville soils, 12 to 18 percent slopes, severely eroded	37	VIe-1	66	1r2	2	4
577	Clayey terrace escarpments	17	VIe-2	66	2r2	2	4
G577	Gravelly terrace escarpments	25	VIs-1	67	3s3	7	4
647	Lawler loam	35	IIs-3	64	3o1	4	5
718	Marsh	36	------	--	---	6	8
727A	Waukee loam, 0 to 4 percent slopes	61	IIs-2	64	2o1	1	1
741C	Oakville fine sand, 2 to 12 percent slopes	42	IVs-1	65	4s2	7	3
741F	Oakville fine sand, 12 to 60 percent slopes	42	VIIs-1	68	3r3	7	4
763A	Joslin silt loam, 0 to 2 percent slopes	32	I-1	62	2o1	1	1
763B	Joslin silt loam, 2 to 6 percent slopes	33	IIe-1	63	2o1	1	1
764A	Coyne fine sandy loam, 0 to 4 percent slopes	19	IIs-2	64	3s2	1	1
764C	Coyne fine sandy loam, 4 to 12 percent slopes	19	IIIe-2	65	3s2	1	3
765A	Trempealeau silt loam, 0 to 4 percent slopes	59	IIs-2	64	2o1	1	1
774	Saude loam	48	IIs-2	64	3s2	7	2
942D2	Seaton-Oakville complex, 7 to 12 percent slopes, eroded	50	VIs-1	67	4s2	7	7

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group
			Symbol	Page	Symbol	Number	Number
943D2	Seaton-Timula silt loams, 7 to 12 percent slopes, eroded	51	IIIe-1	64	3o1	1	3
943E2	Seaton-Timula silt loams, 12 to 18 percent slopes, eroded	51	IVe-1	65	3r2	2	4
943F2	Seaton-Timula silt loams, 18 to 30 percent slopes, eroded	51	VIe-1	66	3r2	3	4
944E2	Velma-Coatsburg silt loams, 12 to 18 percent slopes, eroded	60	VIe-2	66	3r2	2	4
945E2	Hickory-High Gap silt loams, 12 to 18 percent slopes, eroded	27	VIe-2	66	3r2	2	4
945F	Hickory-High Gap silt loams, 18 to 30 percent slopes	28	VIIe-2	68	3r2	3	4
945G	Hickory-High Gap silt loams, 30 to 60 percent	[illegible]					

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