SOIL SURVEY OF

St. Clair 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. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968–74. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1974. 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 St. Clair County Soil and Water Conservation District. This survey was financed partly by the Board of Supervisors, St. Clair County, Illinois.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of St. Clair County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in numerical order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and gives the management group and the woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the management groups and the woodland groups.

Foresters and others can refer to the section "Woodland Management and Productivity," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section on wildlife.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the sections "Engineering" and "Recreation."

Engineers and builders can find, under "Engineering Properties," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the sections "Classification of the Soils" and "Formation of the Soils."

Newcomers in St. Clair County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Contents

	Page
Index to mapping units	ii
Summary of tables	iii
General nature of the county	1
Physiography, relief, and drainage	1
Settlement, industry, and farming	1
Climate	2
How this survey was made	2
General soil map	4
Areas dominated by well drained to poorly drained soils that formed in loess on the upland till and outwash plains	4
1. Fayette association	4
2. Muscatine-Tama association	5
3. Alford association	5
4. Iva-Alford association	5
5. Herrick-Virden association	6
Areas dominated by somewhat poorly drained and poorly drained, low- and high-sodium soils that formed in loess on glacial outwash and till plains	6
6. Darmstadt-Piasa association	6
7. Herrick-Piasa association	7
Areas dominated by somewhat poorly drained and poorly drained soils that formed in loess and alluvial sediment on terraces	7
8. Iva-Weir-Herrick association	7
9. Okaw-Hurst association	8
Areas dominated by well drained to poorly drained soils that formed in alluvial sediment on bottom lands	8
10. Wakeland-Bonnie association	8
11. Landes-Riley association	9
12. Darwin association	10
Areas that are dominated by strip mines and have a wide range of slope and soil conditions	10
13. Orthents association	10
Descriptions of the soils	10
Alford series	11
Atterberry series	15
Beaucoup series	16
Bold series	16
Bonnie series	16
Darmstadt series	17
Darwin series	19
Darwin variant	20
Downs series	21
Dupo series	22
Ebbert series	22
Fayette series	23
Gorham series	26
Haymond series	27
Herrick series	27
Hickory series	28
Hurst series	28
Iva series	30
Karnak series	31
Landes series	32
Littleton series	32
Martinsville series	33
Muscatine series	33
Okaw series	34
Onarga series	36
Orthents	36
Otter series	36
Parkville series	37
Piasa series	38
Riley series	39
Sable series	40
Shiloh series	41
Sylvan series	42
Tama series	43
Udifluvents	44
Urban land	44
Virden series	44
Wakeland series	45
Weir series	46
Worthen series	47
Use and management of the soils	47
Crops	48
Capability grouping	48
Management groups	48
Predicted yields	54
Woodland management and productivity	57
Engineering	64
Building site development	66
Sanitary facilities	66
Water management	74
Construction materials	75
Recreation	82
Wildlife	82
Soil properties	90
Engineering properties	91
Physical and chemical properties	91
Soil and water features	97
Engineering test data	104
Classification of the soils	104
Formation of the soils	105
Factors of soil formation	105
Parent material	105
Climate	108
Plants and animals	110
Relief	110
Time	111
Literature cited	111
Glossary	111
Guide to mapping units	Following 114

Issued October 1978

Index to Mapping Units

	Page
308B—Alford silt loam, 1 to 4 percent slopes	11
308B2—Alford silt loam, 1 to 4 percent slopes, eroded	11
308C2—Alford silt loam, 4 to 10 percent slopes, eroded	11
308D2—Alford silt loam, 10 to 18 percent slopes, eroded	13
308C3—Alford silty clay loam, 4 to 10 percent slopes, severely eroded	13
308F3—Alford silty clay loam, 18 to 40 percent slopes, severely eroded	13
H308F—Alford complex, 15 to 30 percent slopes	14
H308C—Alford soils, Karst, 4 to 7 percent slopes	14
H308D—Alford soils, Karst, 7 to 15 percent slopes	14
999E3—Alford-Hickory complex, 12 to 18 percent slopes, severely eroded	14
999F3—Alford-Hickory complex, 18 to 20 percent slopes, severely eroded	14
922C3—Alford-Hurst silty clay loams, 4 to 7 percent slopes, severely eroded	14
922D3—Alford-Hurst silty clay loams, 7 to 15 percent slopes, severely eroded	15
61A—Atterberry silt loam, 0 to 3 percent slopes	15
70—Beaucoup silty clay loam	16
108—Bonnie silt loam	17
620A—Darmstadt silt loam, 0 to 2 percent slopes	18
620B2—Darmstadt silt loam, 2 to 4 percent slopes, eroded	18
620C3—Darmstadt silty clay loam, 4 to 10 percent slopes, severely eroded	19
71—Darwin silty clay	19
U71—Darwin-Urban land complex	19
V71—Darwin Variant silty clay	21
386B—Downs silt loam, 2 to 4 percent slopes	21
386C2—Downs silt loam, 4 to 9 percent slopes, eroded	22
180—Dupo silt loam	22
48—Ebbert silt loam	23
280B—Fayette silt loam, 2 to 4 percent slopes	24
280B2—Fayette silt loam, 3 to 6 percent slopes, eroded	24
280C2—Fayette silt loam, 6 to 12 percent slopes, eroded	24
280D2—Fayette silt loam, 12 to 18 percent slopes, eroded	24
280E—Fayette silt loam, 18 to 30 percent slopes	24
280G—Fayette silt loam, 30 to 60 percent slopes	24
280B3—Fayette silty clay loam, 3 to 6 percent slopes, severely eroded	25
280C3—Fayette silty clay loam, 6 to 12 percent slopes, severely eroded	25
280D3—Fayette silty clay loam, 12 to 18 percent slopes, severely eroded	25
280E3—Fayette silty clay loam, 18 to 30 percent slopes, severely eroded	25
U280B—Fayette-Urban land complex, 1 to 7 percent slopes	25
U280C—Fayette-Urban land complex, 7 to 15 percent slopes	26
U280E—Fayette-Urban land complex, 15 to 25 percent slopes	26
162—Gorham silty clay loam	26
331—Haymond silt loam	27
46—Herrick silt loam	28
8F2—Hickory loam, 18 to 30 percent slopes, eroded	28
338A—Hurst silt loam, 0 to 2 percent slopes	29
338B2—Hurst silt loam, 2 to 5 percent slopes, eroded	29
S338B—Hurst silt loam, 1 to 4 percent slopes, sandy substratum	29
338C2—Hurst silty clay loam, 5 to 10 percent slopes, eroded	30
454A—Iva silt loam, 0 to 2 percent slopes	31
454B—Iva silt loam, 2 to 4 percent slopes	31
454B2—Iva silt loam, 2 to 4 percent slopes, eroded	31
426—Karnak silty clay	31
304B—Landes fine sandy loam, 1 to 6 percent slopes	32
81A—Littleton silt loam, 0 to 2 percent slopes	33
570B—Martinsville loam, 1 to 7 percent slopes	33
41A—Muscatine silt loam, 0 to 3 percent slopes	34
U41B—Muscatine-Urban land complex, 1 to 4 percent slopes	34
84—Okaw silt loam	35
150B—Onarga fine sandy loam, 1 to 4 percent slopes	36
802—Orthents, loamy	36
801C—Orthents, silty, 3 to 10 percent slopes	36
801G—Orthents, silty, 30 to 60 percent slopes	36
76—Otter silt loam	37
619—Parkville silty clay	38
474—Piasa silt loam	39
995—Piasa-Herrick silt loams	39
452—Riley silty clay loam	40
U452—Riley-Urban land complex	40
68—Sable silty clay loam	41
138—Shiloh silty clay loam	41
962E3—Sylvan-Bold silt loams, 15 to 30 percent slopes, severely eroded	42
962G—Sylvan-Bold silt loams, 30 to 60 percent slopes	42
U962F—Sylvan-Bold-Urban land complex, 25 to 60 percent slopes	42
36B—Tama silt loam, 2 to 4 percent slopes	44
36C2—Tama silt loam, 4 to 7 percent slopes, eroded	44
407—Udifluvents, loamy	44
533—Urban land	44
50—Virden silt loam	45
333—Wakeland silt loam	46
165—Weir silt loam	46
37B—Worthen silt loam, 1 to 4 percent slopes	47

Summary of Tables

	Page
General Nature of the County	
Temperature and precipitation (Table 1)	3
Dates for given probabilities of last freezing temperatures in spring and first in fall (Table 2)	4
Descriptions of the Soils	
Acreage and proportionate extent of the soils (Table 3)	12
Crops	
Yields per acre of crops and pasture (Table 4)	55
Woodland Management and Productivity	
Woodland management and productivity (Table 5)	58
Engineering	
Building site development (Table 6)	67
Sanitary facilities (Table 7)	71
Water management (Table 8)	76
Construction materials (Table 9)	79
Recreation	
Recreational development (Table 10)	83
Wildlife	
Wildlife habitat potentials (Table 11)	86
Soil Properties	
Engineering properties and classifications (Table 12)	92
Physical and chemical properties of soils (Table 13)	98
Soil and water features (Table 14)	102
Engineering test data (Table 15)	106
Classification of the Soils	
Classification of the soils (Table 16)	108

SOIL SURVEY OF ST. CLAIR COUNTY, ILLINOIS

By D. L. Wallace, Soil Conservation Service

Fieldwork By D. L. Wallace, D. R. Grantham, and D. B. Phillips, Soil Conservation Service

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

ST. CLAIR COUNTY is in the southwestern part of Illinois (fig. 1). Belleville is the county seat. East St. Louis is the largest city in the county.

General Nature of the County

This section gives general information about St. Clair County. First it discusses physiography, relief, and drainage, and then it describes settlement, industry, and farming. Finally it discusses climate.

Physiography, Relief, and Drainage

Most soils in the county are on uplands. The uplands consist mainly of a glacial till plain or glacial outwash plain that is covered by loess. The thickness of the loess ranges from 100 feet in the western part of the county to 10 feet in the eastern part. Areas of alluvial lands and bottom lands are extensive; they are along the Mississippi and Kaskaskia Rivers and Silver and Richland Creeks.

St. Clair County has relatively low relief. Elevation ranges from about 370 feet above sea level on the bottom lands of the Kaskaskia River near the Monroe County line to about 690 feet above sea level on the uplands east of Dupo.

The northwestern third of the survey area drains into the Mississippi River. The rest drains into the Kaskaskia River by way of Silver and Richland Creeks and other small tributaries.

Sources of water in the county are variable. The American Bottoms, a large part of the Mississippi River flood plain in the East St. Louis area, have an excellent source of underground water. The glacial outwash plains and alluvial areas adjacent to the Kaskasia River have a fair to good source of underground water. In many areas of the uplands, water stored in ponds is used to supply livestock needs.

Settlement, Industry, and Farming

St. Clair County, the first county in Illinois, was established in 1790, and its present boundaries were set in 1825. It has an area of 672.8 square miles, or 430,592 acres. In 1970 the population of the county was 285,174. The population of East St. Louis was 69,996, and the population of Belleville was 41,699.

Schools, colleges, and other educational facilities are readily available to residents of St. Clair County.

Transportation is well developed in the county. Interstate highways 55, 64, and 70 converge in East St. Louis. The rest of the county is served by many U.S. and State highways and is fully accessible by oiled or

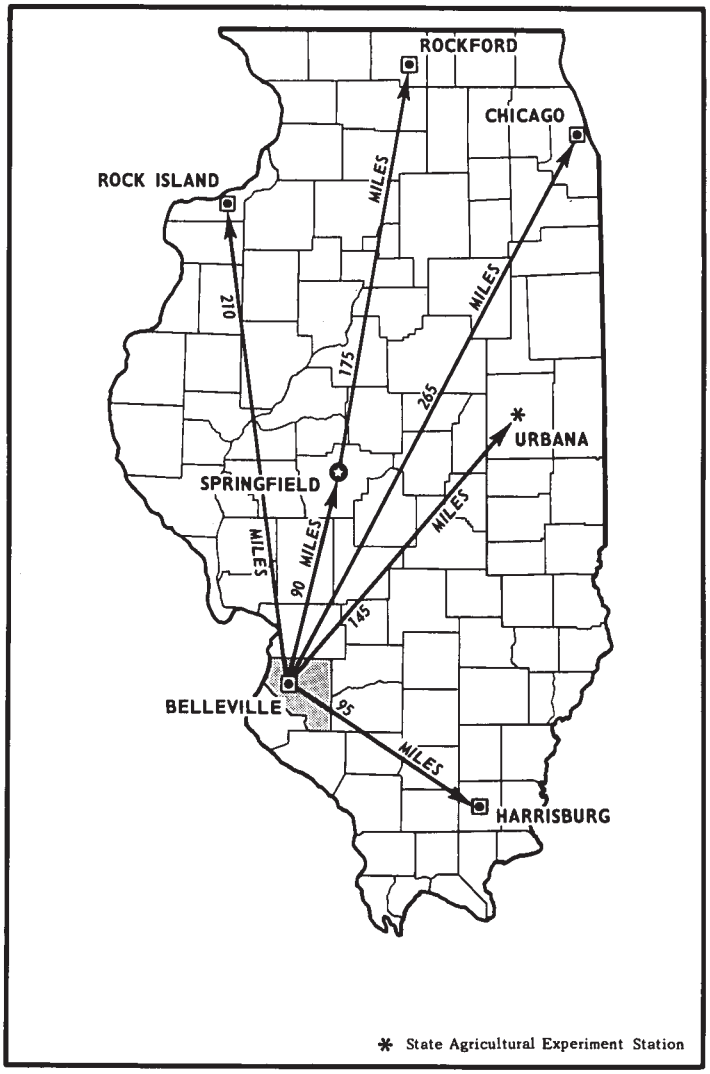


Figure 1.—Location of St. Clair County in Illinois.

gravel roads. East St. Louis is the second largest rail center in the nation, and the rest of the county has an extensive rail network. The county is served by barge-lines. It also has air facilities for general air service, and scheduled air service is available in nearby St. Louis, Missouri. Also located in St. Clair County is Scott Air Force Base, headquarters for the Military Airlift Command.

St. Clair County, as a part of the St. Louis metropolitan area, has a variety of large industries, such as transportation complexes; manufacturers of chemicals, clothing, and shoes; processors of petroleum, steel, aluminum, and food products; livestock handling and marketing; coal mining; and brewing industries.

Farming is a major enterprise in St. Clair County. In 1969 St. Clair County had 1,662 farms, and the average farm was 189 acres in size. Most grain is sold to local elevators, and livestock is marketed in East St. Louis.

Corn, soybeans, and wheat are the main crops. In 1969 soybean acreage was 84,760, corn acreage was 67,240, and wheat acreage was 45,981. About 28,102 acres was in pasture; 21,082 in woodland; and 1,664 in orchards.

In 1969 there were 48,056 swine, about 21,000 beef cattle, 2,794 milk cows, and 284,073 chickens in the county.

Climate [1]

St. Clair County has the continental climate typical of southern Illinois. Minimum temperatures reach 0° F. or below during about 60 percent of the winters, and maximum temperatures reach 100° or higher during about 75 percent of the summers. Weather fronts associated with low pressure systems bring frequent changes in temperature, humidity, cloudiness, and wind direction during much of the year. Such changes are considerably less frequent in summer.

Annual precipitation averages about 38 inches, but it ranges from 25 inches to almost 60 inches. Facts about temperature and precipitation are given in table 1. Less than 30 inches of precipitation occurs only about once in 8 years, and more than 48 inches occurs at about the same frequency. The monthly precipitation averages more than 4 inches in May, June, and August and nearly 4 inches in July. The monthly average for December through February is about 2 inches or less. More than half the annual precipitation normally falls during the growing season of April through September.

Normal rainfall in July and August is insufficient to meet the demand of vigorously growing field crops. For best crop production during most seasons, moisture must be stored in the subsoil during the previous fall through spring. Major droughts are infrequent, but prolonged dry periods during part of the growing season are not uncommon. Such periods usually reduce potential crop yields.

In summer precipitation occurs mostly as showers or thunderstorms of brief duration. A single thunderstorm often produces more than 1 inch of rain and occasionally is accompanied by hail and damaging winds. The most intense short-duration rainfall on record in Illinois occurred in an area southeast of East St. Louis on June 14 and 15, 1957. In a period of about 11 hours, measured rainfall ranged from 12.75 inches to 16.54 inches. During June 1957 the official recorded rainfall in East St. Louis was about 20 inches.

Field crops are most likely to be damaged if hail falls during June, July, and August. Thunderstorms occur on an average of nearly 50 days per year, and less than half of these occur during the critical growing period. Thunderstorms with hail occur less than 3 times per year in a single locality and only about 1 such storm in 2 years occurs during the summer. Not all hailstorms have stones of sufficient quantity or size to produce extensive crop damage.

Snowfalls are light during most winters. Average annual snowfall is less than 12 inches, but more than this has fallen during a single month on several occasions.

January is normally the coldest month. February often has days as cold as January, but cold periods are generally of shorter duration. Temperatures reach 0° or colder on an average of 2 or 3 days annually. The coldest temperature on record was −20° on January 18, 1930. Temperatures about as low are likely to occur in both December and February.

Summers are warm, and warm periods are occasionally prolonged. Invasions of cool air throughout Illinois are less frequent in summer, but many of those that do occur fail to penetrate as far south as St. Clair County. July is normally the warmest month, and maximum temperatures in both July and August average close to 90°. The highest temperature on record was 117° on July 14, 1954. This is also the record high temperature for the State.

The growing season, the number of days between the average date of the last freezing temperature (32° or lower) in spring and the first in fall, is about 200 days. Table 2 indicates the probability of occurrence of several different threshold temperatures. Temperatures often vary considerably from ridges to valleys during radiation freezes, those most likely to damage crops in Illinois.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in St. Clair County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and nature of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the pro-

[1] By WILLIAM L. DENMARK, climatologist for Illinois, National Weather Service, U.S. Department of Commerce.

TABLE 1.—*Temperature and precipitation*

Month	Temperature					Precipitation	
	Average daily maximum	Average daily minimum	Average daily mean	Record highest	Record lowest	Average total	Mean monthly snowfall
	°F	°F	°F	°F	°F	In	In
January	41	22	32	77	−10	2.1	2.9
February	46	26	36	83	−4	2.0	2.2
March	56	34	45	88		3.4	2.8
April	70	45	58	92	20	3.4	0
May	79	55	67	101	31	4.5	0
June	89	65	77	108	46	4.8	0
July	91	68	80	117	50	3.6	0
August	91	67	79	106	48	4.1	0
September	84	58	71	107	36	2.8	0
October	72	46	59	95	24	2.5	0
November	58	36	47	86	3	2.6	.9
December	45	26	36	78	−6	2.1	1.7
Year	69	46	57	117	−10	37.9	10.5

files they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Alford and Darmstadt, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of the soil phase indicates a feature that affects management. For example, Alford silt loam, 1 to 4 percent slopes, eroded, is one of several phases within the Alford series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from such aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind, soil complexes, is shown on the soil map of St. Clair County.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Alford-Hurst silty clay loams, 4 to 7 percent slopes, severely eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Urban land is a land type in St. Clair County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For examples, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to slow permeability

TABLE 2.—*Dates for given probabilities of last freezing temperatures in spring and first in fall*[1]

Probability	Temperature				
	32° F	28° F	24° F	20° F	16° F
Spring:					
Average date	April 9	March 27	March 15	March 7	February 23
25 percent chance after	April 18	April 5	March 24	March 16	March 4
10 percent chance after	April 26	April 13	April 1	March 24	March 12
Fall:					
Average date	October 29	November 3	November 16	November 27	December 7
25 percent chance before	October 20	October 25	November 7	November 18	November 28
10 percent chance before	October 13	October 18	October 31	November 11	November 21

[1] All freeze data are based on 1931–60 records in a standard National Weather Service thermometer shelter at a height of approximately 5 feet above the ground and in a representative exposure. Lower temperatures will exist at times nearer the ground or in local areas subject to extreme air drainage, or both.

or a high water table. They see that streets, road pavements, and foundations for houses crack on a given kind of soil, and they relate this failure to a high shrink-swell potential. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of a soil for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map [2]

The general soil map at the back of this survey shows, in color, the soil associations in the survey area. A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in an association can occur in other associations, but in different patterns.

A map showing soil associations is useful to people who want to have a general idea of the soils in a survey area, who want to compare different parts of that area, or who want to locate large tracts that are suitable for a certain kind of land use. Such a map is a useful guide for broad planning of a watershed, a wooded tract, or a wildlife area or for broad planning of recreational facilities, community developments, and such engineering works as transportation corridors. It is not a suitable map for detailed planning for management of a farm or field or for selecting the exact location of a road or building or other structure, because the soils within an association ordinarily vary in slope, depth, stoniness, drainage, and other characteristics that affect their management.

[2] By DONALD B. PHILLIPS, soil scientist, Soil Conservation Service.

The soil associations in this survey area have been grouped into general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in it are described on the following pages.

Areas Dominated by Well Drained to Poorly Drained Soils That Formed in Loess on the Upland Till and Outwash Plains

1. Fayette association

Gently sloping to very steep, well drained soils that formed in loess under forest on uplands

This association consists mainly of upland ridges in steep valleys that have many small streams. It also consists of morainal ridges and mounds that have rounded hilltops that rise above the upland plain. It is the southern limit of Fayette soils in Illinois, and because of this, these soils closely resemble Alford soils.

This association makes up about 17 percent of the county. It is about 85 percent Fayette soils and 15 percent minor soils.

Fayette soils are on narrow ridges, hilltops, and steep valley slopes. They are well drained. Typically, the surface layer is dark grayish brown silt loam, but it is brown on eroded slopes where the silty clay loam subsoil is exposed. The underlying material is yellowish brown silt loam.

The minor soils in this association are in the Worthen, Wakeland, Hickory, Sylvan, and Bold series. Worthen soils are on colluvial foot slopes. Somewhat poorly drained Wakeland soils are in small creeks and drainageways. Hickory soils are on the lower side slopes of steep, eroded valleys. The very steep Sylvan and Bold soils are in areas on side slopes on bluffs above the major streams. These soils are intermingled. Thickness of the subsoil varies, and the underlying material is calcareous silt loam.

Organic-matter content is low, and available water capacity is high. The hazard of erosion is serious in unprotected, steep areas that were once in native hardwood forests. Many steep areas need improved wood-

land management. Obtaining an ample supply of pure water and efficiently disposing of sewage are concerns in urban developments in many areas of this association. The main needs of management are controlling erosion and using land selectively.

The areas of gently sloping to sloping soils in this association are well suited to corn, soybeans, small grain, and hay.

2. *Muscatine-Tama association*

Nearly level to sloping, well drained to somewhat poorly drained soils that formed in loess under grasses on uplands

This association consists of a nearly level to gently undulating upland plateau. Slopes along drainageways and low morainal ridges are sloping.

This association makes up about 4 percent of the county. It is about 80 percent Muscatine soils, 15 percent Tama soils, and 5 percent minor soils.

Muscatine soils are in nearly level to slightly concave areas. They are somewhat poorly drained. Typically, the surface layer is very dark brown and very dark gray silt loam about 16 inches thick. The subsoil is very dark grayish brown, dark yellowish brown, and yellowish brown silty clay loam that has yellowish brown and yellowish red mottles in the upper part. The underlying material is light brownish gray silt loam.

Tama soils are on rounded ridgetops and knolls. They are well drained. Typically, the surface layer is dark brown silt loam about 11 inches thick. The subsoil is dark brown to brown silty clay loam about 38 inches thick. The underlying material is brown silt loam.

The minor soils in this association are in the Atterberry, Downs, and Virden series. Atterberry and Downs soils are on the border between the prairie and the woodland. They have a dark colored plow layer and a light colored subsurface layer and subsoil. Somewhat poorly drained Atterberry soils are in slight depressions, and moderately well drained Downs soils are on the side slopes of drainageways. Virden soils are dark gray to black and are in wet depressions.

Fertility and organic-matter content are moderate to high, and available water capacity is very high. The main concerns of management are controlling water erosion, improving drainage, and maintaining tilth and fertility.

The soils in this association are well suited to corn, soybeans, small grain, and hay. Most areas are used for cultivated crops, but urban development is expanding into this prime farming land.

3. *Alford association*

Gently sloping to steep, well drained soils that formed in loess under forest on uplands that have karst topography

This association consists of a deep loess upland ridge over limestone bedrock. Slopes are gentle to steep in many circular depressions that are 10 feet to more than 100 feet deep. Sinkholes are generally close together and have a narrow, saddle-shaped ridge between them.

This association makes up about 2 percent of the county. It is about 90 percent Alford soils and 10 percent minor soils.

Alford soils are on narrow, gently sloping to steep saddle ridges that descend into deep sinkholes. They are well drained. Typically the surface layer, where cultivated, is yellowish brown silty clay loam about 7 inches thick. It is severely eroded and is mixed with the upper part of the subsoil. The subsoil is yellowish brown silty clay loam about 40 inches thick. The underlying material is yellowish brown silt loam. In very steep areas along the Mississippi River bluffs, the underlying limestone is exposed.

The minor soil in this association is in the Wakeland series. Somewhat poorly drained Wakeland soils are on the concave bottoms of sinkholes and in drainageways to sinkholes.

Organic-matter content is low, and available water capacity is high. The main concerns of management are controlling erosion and maintaining tilth and fertility. Unstable steep slopes and ground water pollution are the main limitations to nonfarm uses.

These soils in this association are well suited to corn, soybeans, small grain, and hay. Most areas are used for cultivated crops, but urban development is expanding into some areas.

4. *Iva-Alford association*

Nearly level to steep, somewhat poorly drained and well drained soils that formed in loess under forest on upland glacial outwash plains

This association consists of a long very gently sloping plain that has low-gradient streams. Slopes are short and range from nearly level to steep.

This association makes up about 26 percent of the county. It is about 80 percent Iva soils, 10 percent Alford soils, and 10 percent minor soils.

Iva soils are nearly level to very gently sloping. They are somewhat poorly drained. Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is pale brown, light brownish gray, and grayish brown silty clay loam about 35 inches thick. It has yellowish brown mottles. The underlying material is light olive brown silt loam.

Alford soils are sloping to steep. They are on ridges and draws that drain into streams. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is silty clay loam about 40 inches thick. It is yellowish brown in the upper part and grayish brown and yellowish brown in the lower part. The underlying material is mottled, grayish brown silt loam.

The minor soils in this association are in the Weir and Wakeland series. Poorly drained Weir soils are in nearly level concave areas. Wakeland soils are on small bottom lands.

Organic-matter content is low, and available water capacity is high. The main concerns of management are controlling erosion in sloping areas, improving drainage in depressions, and maintaining fertility and tilth.

Level to moderately sloping areas in this association are well suited to corn, soybeans, small grain, hay, and pasture. Strongly sloping areas are suited to pasture.

Steep eroded areas are better suited to woodland and wildlife habitat than to most other uses.

5. *Herrick-Virden association*

Nearly level to gently sloping, poorly drained and somewhat poorly drained soils that formed in loess under grasses on upland glacial outwash plains.

This association consists of a glacial outwash plain that gradually rises to an upland till plain. Slopes are mostly level, but they are gently sloping near the upland till plain (fig. 2) and in drainageways.

This association makes up about 9 percent of the county. It is about 55 percent Herrick soils, 30 percent Virden soils, and 15 percent minor soils.

Herrick soils are nearly level to gently sloping. They are somewhat poorly drained. Typically, the surface layer is very dark gray to very dark brown silt loam about 15 inches thick. The subsoil is silty clay loam about 41 inches thick. The upper part of the subsoil is yellowish brown, and the lower part is light gray and has reddish yellow to strong brown mottles. The underlying material is light gray silt loam.

Virden soils are in depressions and in nearly level low lying areas. They are poorly drained. Typically, the surface layer is very dark gray to black silt loam about 17 inches thick. The subsoil is about 36 inches thick. It is very dark gray and light brownish gray silty clay loam in the upper part and mottled, light yellowish brown and grayish brown silt loam in the lower part. The underlying material is light olive gray silt loam.

The minor soils in this association are in the Ebbert series. Poorly drained Ebbert soils are in depressions or low areas along with Virden soils.

Natural fertility and organic-matter content are moderate to high. Available water capacity is high. The main concern of management is improving drainage.

The soils in this association are well suited to corn, soybeans, small grain, and hay. Most areas are used for cultivated crops.

Areas Dominated by Somewhat Poorly Drained and Poorly Drained, Low- and High-Sodium Soils That Formed in Loess on Glacial Outwash and Till Plains

6. *Darmstadt-Piasa association*

Nearly level to sloping, somewhat poorly drained and poorly drained, high-sodium soils that formed in loess under forest and grasses on glacial outwash plains

This association consists of a gently undulating, ice- and water-worked, glaciofluvial plain about 20 to 50 feet above the Kaskaskia River flood plain. Slopes are mostly nearly level, but in some areas drainageways have cut shallow draws into the foot slopes of morainal ridges. Short, moderate slopes are common where U-shaped drainageways enter small streams.

This association makes up about 7 percent of the county. It is about 50 percent Darmstadt soils, 40 percent Piasa soils, and 10 percent minor soils.

Darmstadt soils are on slightly elevated, flattened rises and the sides of shallow drainageways. They are

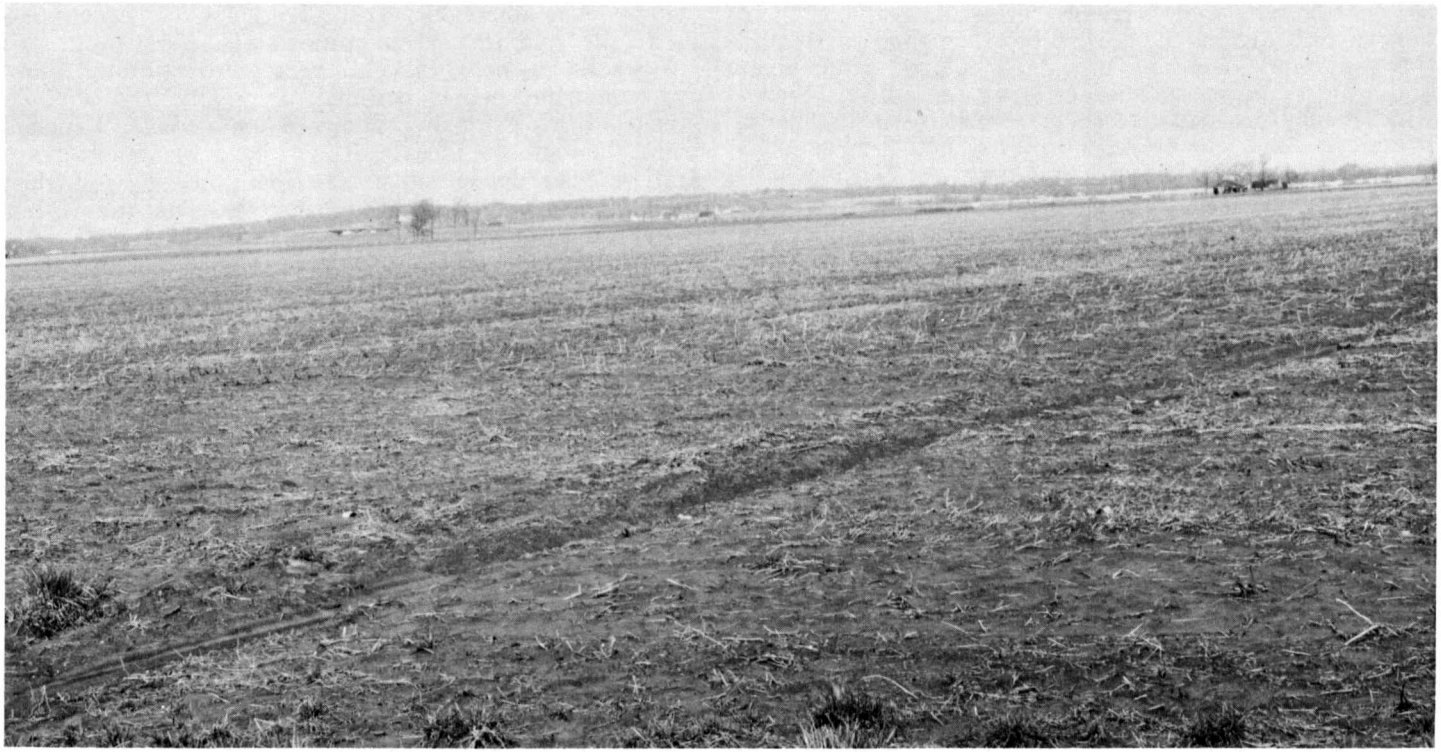


Figure 2.—Area of Herrick-Virden association. This association is suitable for intensive farming. Fayette association is in the background.

somewhat poorly drained. Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is silty clay loam about 28 inches thick; it is brown and pale brown in the upper part and light gray in the lower part. The underlying material is light gray silt loam. Sodium in the subsoil inhibits plant growth by restricting permeability and roots. Small areas in which the high-sodium subsoil is just below the surface are locally referred to as scalds or slicks.

Piasa soils are in depressions. They are poorly drained and nearly level to slightly concave. Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is grayish brown silty clay loam about 44 inches thick. The underlying material is grayish brown silt loam. Sodium in the subsoil inhibits plant growth by restricting permeability and roots.

The minor soils in this association are in the Herrick, Ebbert, and Iva series. These soils do not have a high concentration of sodium in the subsoil. Somewhat poorly drained Herrick soils have a very dark gray to black surface layer and are in broad, flat areas. Poorly drained Ebbert soils are in broad, trapped depressions. Somewhat poorly drained Iva soils have a light colored surface layer and are in areas near the border between the prairie and the timber.

The main concerns of management are controlling water erosion, improving drainage, and maintaining tilth and fertility.

The soils in this association are used for corn, soybeans, small grain, and hay. Most crops grown on Darmstadt and Piasa soils are quickly retarded by drought, but soybeans and small grain are less affected by drought than are most other crops.

7. *Herrick-Piasa association*

Nearly level, somewhat poorly drained, low-sodium soils and poorly drained, high-sodium soils that formed in loess under grasses on glacial outwash and till plains

This association consists of a nearly level plain that is gently sloping to moderately sloping into drainageways.

This association makes up about 5 percent of the county. It is about 50 percent Herrick soils, 30 percent Piasa soils, and 20 percent minor soils.

Herrick soils are in broad, flat areas. They are somewhat poorly drained. Typically, the surface layer is very dark brown and very dark gray silt loam about 15 inches thick. The subsoil is yellowish brown to light gray silty clay loam about 41 inches thick. The underlying material is light gray silt loam.

Piasa soils are in nearly level to slightly concave depressions where water ponds near drainageways. They are poorly drained. Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is grayish brown silty clay loam about 44 inches thick. The underlying material is grayish brown silt loam. The subsoil has excess sodium.

The minor soils in this association are in the Virden series. Virden soils are wet and are in swales and low concave areas. The surface layer is dark gray to black.

Organic-matter content is moderate on Herrick soils and is moderately low on Piasa soils. The main concerns of management are improving drainage, controlling erosion along moderately sloping drainageways, and maintaining tilth and fertility.

The soils in this association are moderately well suited to corn, soybeans, small grain, and hay. Most areas are used for the cultivated crops grown in the county.

Areas Dominated by Somewhat Poorly Drained and Poorly Drained Soils That Formed in Loess and Alluvial Sediment on Terraces

8. *Iva-Weir-Herrick association*

Nearly level to gently sloping, somewhat poorly drained and poorly drained soils that formed in loess under forest and grasses on terraces

This association consists mainly of nearly level terraces about 10 to 20 feet above the Kaskaskia River flood plain (fig. 3). Short drainageways have cut moderately steep slopes into the clay underlying material. Slightly elevated plateaus separate broad, flat, wet areas.

This association makes up about 5 percent of the county. It is about 40 percent Iva soils, 25 percent Weir soils, 15 percent Herrick soils, and 20 percent minor soils.

Iva soils are in nearly level, slightly elevated areas and on gently sloping side slopes of drainageways. They are somewhat poorly drained. Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is pale brown, light brownish gray, and grayish brown silty clay loam about 30 inches thick. It has yellowish brown mottles. The underlying material is mainly silt loam, but in many areas it is gray silty clay.

Weir soils are on level to slightly depressional flats. They are poorly drained. Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is grayish brown and light brownish gray silt loam about 10 inches thick. The subsoil is light brownish gray silty clay loam about 50 inches thick. The underlying material is mixed light brownish gray and yellowish brown silt loam.

Herrick soils are in slightly elevated areas. They are somewhat poorly drained. Typically, the surface layer is very dark gray and very dark brown silt loam about 15 inches thick. The subsoil is yellowish brown to light gray silty clay loam about 41 inches thick. The underlying material is gray silt loam.

The minor soils in this association are in the Hurst, Virden, Ebbert, and Onarga series. Somewhat poorly drained Hurst silty clay is on moderately steep side slopes of lower terraces on the Kaskaskia River bottoms. Poorly drained Virden soils are in wet depressional swales. Poorly drained Ebbert soils are also in depressions. Well drained Onarga soils are on low knolls. These soils are dark brown fine sandy loam.

The main concerns of management are removing excess water, improving drainage, maintaining tilth and fertility, and controlling erosion.

The soils in this association are well suited to corn, soybeans, small grain, and hay. Removal of excess water is required for optimum yields. Most sloping areas are better suited to hay, pasture, or woodland than to most other uses.

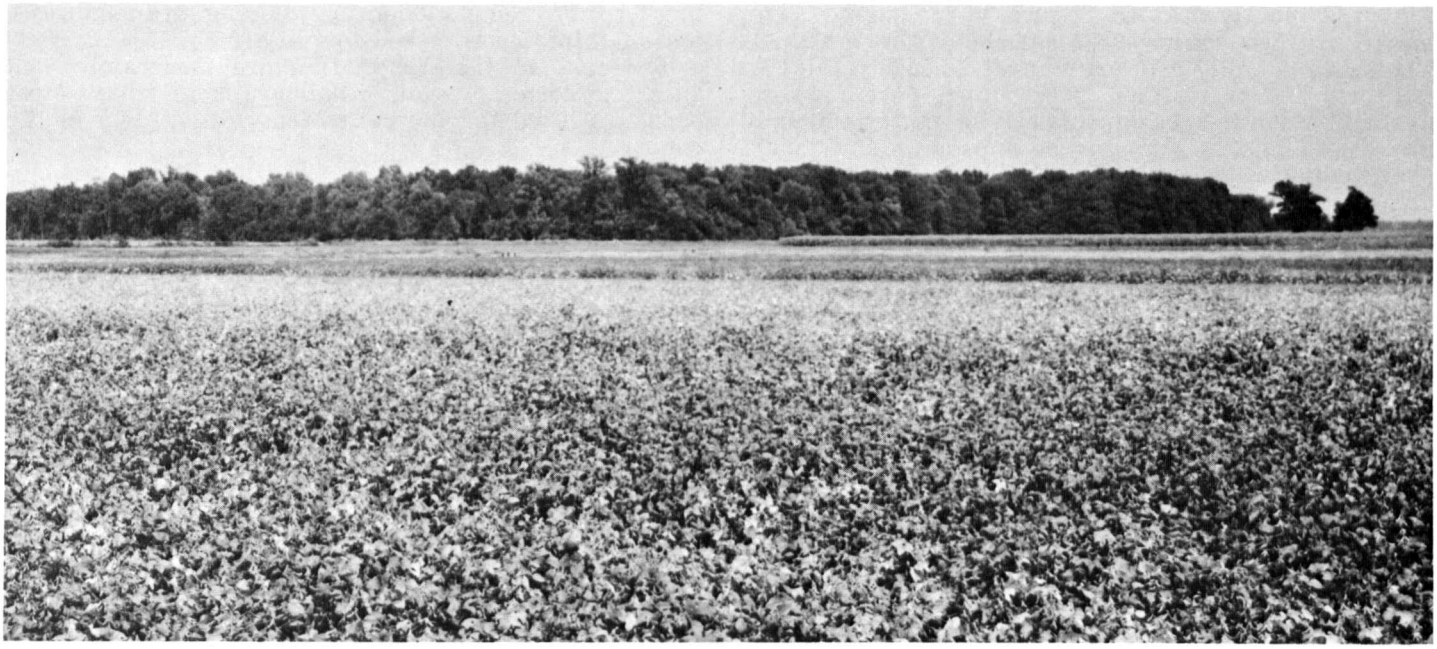


Figure 3.—Area of Iva-Weir-Herrick association. The nearly level plain and absence of relief is typical of this association.

9. *Okaw-Hurst association*

Nearly level to strongly sloping, poorly drained and somewhat poorly drained soils that formed in alluvial sediment under forest on low terraces

This association consists mainly of a nearly level low terrace, but in some areas streams have cut into the plain (fig. 4). Side slopes extending into the Kaskaskia River flood plain are short and are sloping to strongly sloping. Overflow from the Kaskaskia River has cut swales and deposited sandy ridges along the edge of the terrace plain.

This association makes up about 2 percent of the county. It is about 55 percent Okaw soils, 30 percent Hurst soils, and 15 percent minor soils.

Okaw soils are nearly level and poorly drained. Typically, the surface layer is dark gray silt loam about 4 inches thick. A subsurface layer is gray silty clay loam about 4 inches thick. The subsoil is silty clay about 66 inches thick. It is dark gray in the upper part and grayish brown in the lower part.

Hurst soils are on side slopes of drainageways and short side slopes that extend into the Kaskaskia River bottoms. They are somewhat poorly drained. Typically, the surface layer is grayish brown silt loam about 7 inches thick. The subsurface layer is grayish brown and light brownish gray silt loam about 5 inches thick. The subsoil is about 48 inches thick. It is grayish brown, yellowish brown, and pale brown silty clay in the upper part and light brownish gray silty clay loam in the lower part.

The minor soils in this association are in the Onarga and Martinsville series. There are also areas of somewhat poorly drained, nearly level soils. Dark colored Onarga soils are on the high sandy ridges. Moderately well drained Martinsville soils are on side slopes and ridges of swales. These soils are light colored silt loams underlain by stratified silt and sand.

Hurst and Okaw soils have very slow permeability and low organic-matter content. They are seasonally wet. The main concerns of management are improving drainage, maintaining tilth and fertility, and controlling erosion.

The soils in this association are suited to most crops grown in the county. Most areas are cultivated, a few steep and wet areas are forested, and some areas are used for wildlife habitat. The main farming enterprises are cash crops, pasture for livestock, and timber.

Areas Dominated by Well Drained to Poorly Drained Soils That Formed in Alluvial Sediment on Bottom Lands

10. *Wakeland-Bonnie association*

Nearly level, somewhat poorly drained and poorly drained soils that formed in silty alluvial sediment under forest on bottom lands

This association consists of a nearly level flood plain that has low-gradient meandering streams. New stream channels are commonly made when flooded streams overflow and old channels are abandoned to form shallow sloughs.

This association makes up about 11 percent of the county. It is about 65 percent Wakeland soils, 25 percent Bonnie soils, and 10 percent minor soils.

Wakeland soils are adjacent to streambanks and small tributary streams. They are somewhat poorly drained. Typically, the surface layer is dark grayish brown silt loam about 14 inches thick. The underlying material is mixed, dark grayish brown and brown silt loam that has dark yellowish brown mottles.

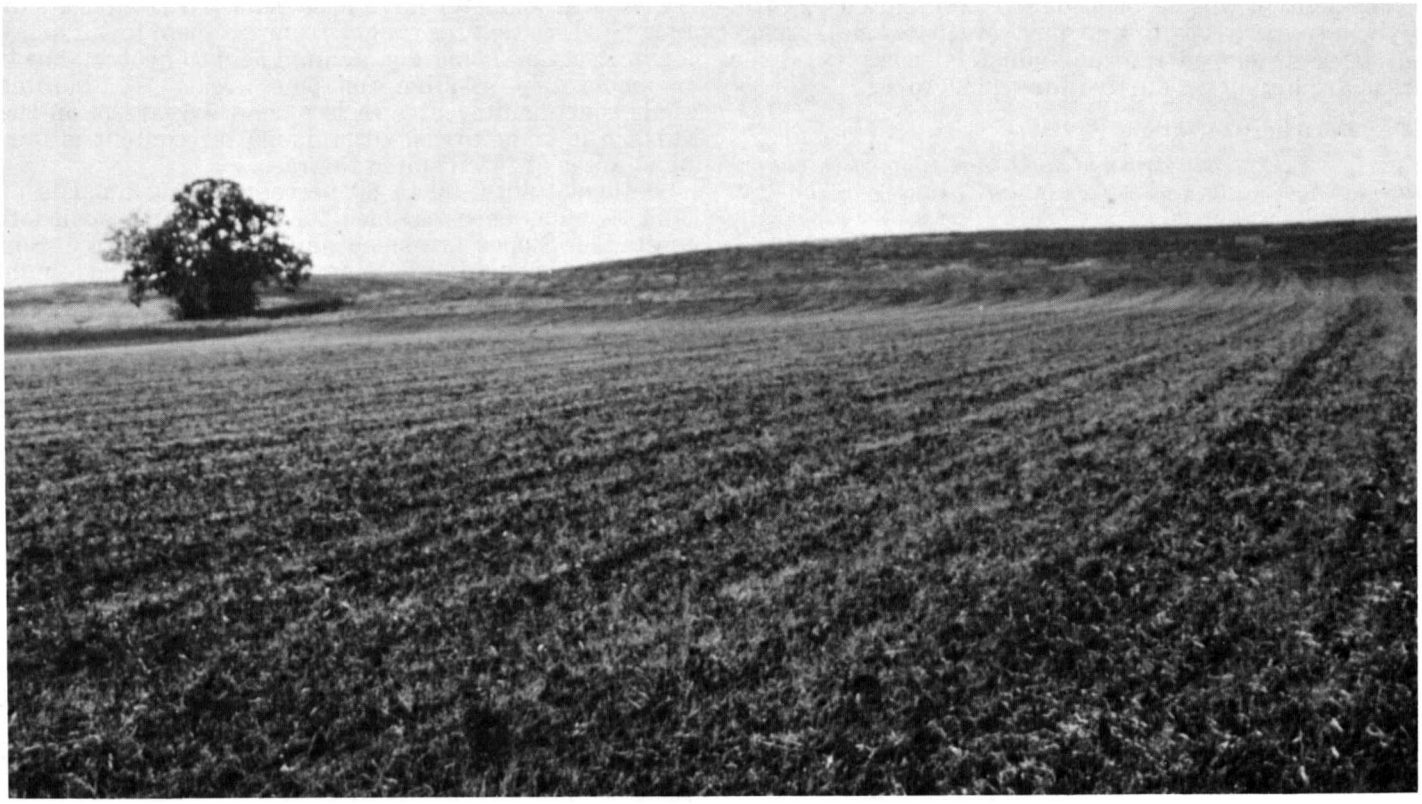


Figure 4.—**Terrace break between Okaw-Hurst association in foreground and Darmstadt-Piasa association in background.**

Bonnie soils are on level to depressional flats. They are poorly drained. Typically, the surface layer is mottled, dark grayish brown silt loam about 3 inches thick. The underlying material is gray, dark gray, and grayish brown silt loam that has brown mottles.

The minor soils in this association are in the Otter and Karnak series. Otter soils are on bottom lands of upland tributary streams that drain dark colored prairie soils. These soils are dark colored silt loam. Karnak soils formed in silty clay sediment in old abandoned stream channels of the Kaskaskia River.

Because most areas are not protected by levees, providing drainage and controlling flooding are the main concerns of management.

If protected from flooding, the soils in this association are well suited to corn, soybeans, small grain, and hay. Much of the Kaskaskia River bottoms supports trees that thrive in wet conditions. Some wet areas are used for pasture and wetland wildlife.

11. Landes-Riley association

Nearly level to sloping, well drained to somewhat poorly drained soils that formed in loamy and sandy alluvial sediment under forest and grasses on bottom lands

This association consists of an undulating bottom land made up of sandy ridges, fans, and swales. Ridges formed by overflow deposits of the Mississippi River and alluvial fan deposits from upland streams are gently sloping.

This association makes up about 6 percent of the county. It is about 50 percent Landes soils, 45 percent Riley soils, and 5 percent minor soils.

Landes soils are on rounded, long, narrow ridges. They are nearly level to sloping and well drained. Typically, the surface layer is very dark grayish brown fine sandy loam about 13 inches thick. The subsoil is dark brown loamy fine sand about 19 inches thick. The underlying material is dark brown loamy fine sand and pale brown fine sand.

Riley soils are in concave areas between ridges of Landes soils. They are nearly level and somewhat poorly drained. Typically, the surface layer is very dark brown and very dark gray silty clay loam about 12 inches thick. The subsoil is dark grayish brown and dark brown loam about 12 inches thick. The underlying material is stratified, very pale brown sand and dark grayish brown silt.

The minor soils in this association are in the Gorham, Worthen, and Littleton series. Somewhat poorly drained Gorham soils are in swales and low areas. Moderately well drained Worthen soils are in gently sloping to moderately sloping higher areas on alluvial fans. Somewhat poorly drained Littleton soils are in lower, very gently sloping areas.

Natural fertility is high. Available water capacity is moderate on sandy soils, but very high on Worthen and Littleton soils. Most areas are protected from flooding by the Mississippi River by high levees. The main concerns of management are conserving moisture, maintaining tilth and fertility, and improving drainage in some swales.

The soils in this association are well suited to corn, soybeans, small grain, and hay. Much of the acreage has been developed into an industrial complex. Some areas are highly productive for truck crops.

12. Darwin association

Nearly level, poorly drained soils that formed in clayey alluvial sediment under forest and grasses on bottom lands

This association consists of large sloughs, old river channel cuts, spills, and trapped shallow ponded areas.

This association makes up about 3 percent of the county. It is about 70 percent Darwin soils and 30 percent minor soils.

Darwin soils are in slack-water sloughs, in ponded areas, and on channel bottoms. They are poorly drained. Typically, the surface layer is black silty clay about 12 inches thick. The subsoil is very dark gray to gray silty clay about 50 inches thick. In some areas, the underlying material is sandy, stratified material.

The minor soils in this association are in the Parkville, Dupo, and Beaucoup series. Somewhat poorly drained Parkville soils are on the upper ends of sloughs that finger into sandy ridges. Dupo soils are in areas that have light colored silty overwash over black silty clay. Beaucoup soils are in low-lying slack-water areas where the surface layer is very dark gray silty clay loam.

Natural fertility and available water capacity are high. Most areas are protected by an extensive levee system, but during prolonged periods of flooding, low areas become ponded and water rises to the surface. Water must then be pumped out of many areas. The main concerns of management are improving drainage, maintaining tilth, and controlling flooding. Careful planning of land use and using specified management practices are needed.

The soils in this association are well suited to corn, soybeans, and small grain. Industrial areas are expanding or already exist in some areas.

Areas That are Dominated by Strip Mines and Have a Wide Range of Slope and Soil Conditions

13. Orthents association

Gently sloping to very steep, somewhat poorly drained to well drained soils in strip-mined areas

This association consists of disturbed areas that result from surface mining operations. It is characterized by areas of spoil that have been worked to flatten sharp ridges and bury undesirable rock and by areas of spoil that have not been touched after the mining operations. Under current laws, spoil is reshaped to nearly conform to the original landform. Soil material is variable in both conditions, but the shaping of slopes allows tillage.

This soil association makes up about 3 percent of the county. It consists of Orthents, silty, 3 to 10 percent slopes; Orthents, silty, 30 to 60 percent slopes; and Orthents, loamy (1 to 15 percent slopes).

Orthents, silty, 3 to 10 percent slopes, consists of land that has been stripped for coal and the spoil reshaped to allow tillage. All exposed rocks larger than 8 inches in diameter have been removed from the surface. Surface texture ranges from silt loam to silty clay loam. Reaction is mainly medium acid to neutral, but it is moderately alkaline in some areas. Weatherable shale that disintegrates in less than 5 years is on the surface in some areas. Organic-matter content is low. Most areas are well suited to grass.

Orthents, silty, 30 to 60 percent slopes, consists of land that has been stripped for coal and the spoil left ungraded. Slopes are steep and commonly rocky. Soil slippage or sloughing is common. Some areas have narrow, leveled ridgetops. Lower, stable slopes are well suited to native softwood trees. Some areas are in pasture.

Orthents, loamy (1 to 15 percent slopes), consists of land that has resulted from spoil from canal dredging and levee and highway construction. Slopes are nearly level to moderately sloping. Surface texture ranges from silty to sandy. These areas are subject to soil blowing. They are sparsely vegetated.

Descriptions of the Soils

This section describes the soil series and mapping units in St. Clair County. A soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically 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. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit.

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

Preceding the name of each mapping unit is a symbol that identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the management group and woodland group in which the mapping unit has been placed. An explanation of the capability classification system is given in the section "Capability Grouping." A discussion of woodland groups is given in the section "Woodland Management and Productivity." The "Guide to Mapping Units" at the back of this survey shows the management group and the woodland group to which each soil in the survey area has been assigned.

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 back of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*10*).[3]

Alford Series

The Alford series consists of nearly level to very steep, well drained soils that formed in thick silty material under a hardwood forest. These soils are on uplands in the eastern and southern parts of the county.

In a representative profile the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is yellowish brown silt loam about 10 inches thick. The upper 20 inches of the subsoil is yellowish brown silty clay loam; the middle 6 inches is yellowish brown and dark brown silty clay loam; and the lower 14 inches is grayish brown light silty clay loam that has brown, dark brown, and pale brown mottles. The underlying material is grayish brown silt loam that has brown, dark brown, and pale brown mottles.

Organic-matter content is low. Permeability is moderate, and available water capacity is high.

Alford soils are suited to farming. They are well suited to open-land and woodland wildlife, but are unsuited to wetland wildlife. Alford soils are used for both farm and nonfarm uses. Limitations for many nonfarm uses are slight to severe, depending on slope.

Representative profile of Alford silt loam, 1 to 4 percent slopes, 260 feet east and 810 feet south of the center of sec. 4, T. 2 S., R. 7 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine and fine crumb structure; friable; neutral; abrupt smooth boundary.

A21—8 to 13 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct dark brown (7.5YR 3/2) mottles; weak thick platy structure parting to weak medium subangular blocky; friable; medium acid, clear smooth boundary.

A22—13 to 18 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct dark brown (7.5YR 3/2) mottles; weak fine angular blocky structure; friable; medium acid; clear smooth boundary.

B1t—18 to 21 inches; yellowish brown (10YR 5/6) light silty clay loam; moderate medium subangular blocky structure parting to strong fine subangular blocky; friable to firm; medium acid; abrupt smooth boundary.

B21t—21 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium angular blocky structure; firm; thick continuous yellowish brown (10YR 5/4) silt coats on ped faces; very strongly acid; abrupt smooth boundary.

B22t—23 to 33 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium prismatic structure parting to strong medium angular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and patchy yellowish brown (10YR 5/4) silt coats on ped faces; very strongly acid; gradual smooth boundary.

B23t—33 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint yellowish brown (10YR 5/4) mottles; strong medium angular blocky structure; firm; nearly continuous dark brown (7.5YR 4/4) clay films on ped faces; very strongly acid; clear smooth boundary.

B24t—38 to 44 inches; mixed yellowish brown (10YR 5/4 and 5/6) and dark brown (7.5YR 4/4) silty clay loam; moderate medium prismatic structure; firm to friable; patchy yellowish brown (10YR 5/4) silt coats and patchy dark brown (7.5YR 4/4) clay films on ped faces; common fine iron and manganese concretions; very strongly acid; clear smooth boundary.

B3t—44 to 58 inches; grayish brown (10YR 5/2) light silty clay loam; many fine distinct brown (10YR 5/3) and dark brown (7.5YR 3/2) mottles and many medium faint pale brown (10YR 6/3) mottles; weak coarse prismatic structure; friable; very strongly acid; gradual smooth boundary.

C—58 to 78 inches; grayish brown (10YR 5/2) silt loam; many fine distinct brown (10YR 5/3) and dark brown (7.5YR 3/2) mottles and many medium faint pale brown (10YR 6/3) mottles; massive; friable; medium acid.

The Ap horizon ranges from dark grayish brown to dark brown and is 6 to 9 inches thick. The A2 horizon ranges from grayish brown to yellowish brown and is 2 to 11 inches thick. The B horizon is grayish brown, yellowish brown, dark brown, or dark yellowish brown. In some places, gray, grayish brown, or brownish gray mottles are in the lower part of the B horizon. The B horizon is medium acid to strongly acid.

Alford soils formed in the same kind of material in which Iva soils formed and are in similar positions on the landscape as those soils. Alford soils are well drained, whereas Iva soils are somewhat poorly drained.

308B—Alford silt loam, 1 to 4 percent slopes. This nearly level to gently sloping soil is mainly on ridgetops and in and around watercourses. The areas on ridgetops are relatively large and are uniform in shape, and the areas in and around watercourses are small and are irregular in shape. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of moderately sloping soils and areas of grayish soils in and around watercourses. Also included are small areas of somewhat poorly drained Iva soils.

Runoff is medium, and the hazard of erosion is slight. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIe–1; woodland group 1o.

308B2—Alford silt loam, 1 to 4 percent slopes, eroded. This gently sloping soil is mainly in and around the upper part of watercourses. Individual areas are relatively small and are irregular in shape. This soil has less than 7 inches of the original surface layer remaining. This is mixed with the upper part of the subsoil in plowed areas, and here the plow layer is yellowish brown and has more clay than that of uneroded Alford soils.

Included with this soil in mapping are small areas of moderately sloping soils. Also included are small areas of somewhat poorly drained soils and areas of soils that have more gray colors than this Alford soil.

Runoff is medium. Because of the position of the soil on the landscape, the hazard of erosion is moderate. Controlling erosion, minimizing crust formation, and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIe–2; woodland group 1o.

308C2—Alford silt loam, 4 to 10 percent slopes, eroded. This sloping soil is mainly in and around watercourses. Individual areas are generally long, are

[3] Italic numbers in parentheses refer to Literature Cited, p. 111.

TABLE 3.—*Acreage and proportionate extent of the soils*

Map symbol	Soil name	Acres	Percent
8F2	Hickory loam, 18 to 30 percent slopes, eroded	680	0.2
36B	Tama silt loam, 2 to 4 percent slopes	5,250	1.2
36C2	Tama silt loam, 4 to 7 percent slopes, eroded	2,420	.6
37B	Worthen silt loam, 1 to 4 percent slopes	940	.2
41A	Muscatine silt loam, 0 to 3 percent slopes	7,865	1.8
U41B	Muscatine-Urban land complex, 1 to 4 percent slopes	2,795	.6
46	Herrick silt loam	27,890	6.5
48	Ebbert silt loam	2,740	.6
50	Virden silt loam	7,115	1.7
61A	Atterberry silt loam, 0 to 3 percent slopes	4,650	1.1
68	Sable silty clay loam	725	.2
70	Beaucoup silty clay loam	1,140	.3
71	Darwin silty clay	7,800	1.8
U71	Darwin-Urban land complex	1,275	.3
V71	Darwin Variant silty clay	2,240	.5
76	Otter silt loam	1,095	.2
81A	Littleton silt loam, 0 to 2 percent slopes	1,410	.3
84	Okaw silt loam	5,725	1.3
108	Bonnie silt loam	12,750	3.0
138	Shiloh silty clay loam	1,390	.3
150B	Onarga fine sandy loam, 1 to 4 percent slopes	345	.1
162	Gorham silty clay loam	680	.2
165	Weir silt loam	5,775	1.3
180	Dupo silt loam	1,595	.4
280B	Fayette silt loam, 2 to 4 percent slopes	19,090	4.4
280B2	Fayette silt loam, 3 to 6 percent slopes, eroded	7,845	1.8
280B3	Fayette silty clay loam, 3 to 6 percent slopes, severely eroded	1,385	.3
280C2	Fayette silt loam, 6 to 12 percent slopes, eroded	4,905	1.1
280C3	Fayette silty clay loam, 6 to 12 percent slopes, severely eroded	5,785	1.3
280D2	Fayette silt loam, 12 to 18 percent slopes, eroded	2,525	.6
280D3	Fayette silty clay loam, 12 to 18 percent slopes, severely eroded	2,800	.6
280E	Fayette silt loam, 18 to 30 percent slopes	4,305	1.0
280E3	Fayette silty clay loam, 18 to 30 percent slopes, severely eroded	995	.2
280G	Fayette silt loam, 30 to 60 percent slopes	1,540	.4
U280B	Fayette-Urban land complex, 1 to 7 percent slopes	4,935	1.1
U280C	Fayette-Urban land complex, 7 to 15 percent slopes	830	.2
U280E	Fayette-Urban land complex, 15 to 25 percent slopes	420	.1
304B	Landes fine sandy loam, 1 to 6 percent slopes	2,905	.7
308B	Alford silt loam, 1 to 4 percent slopes	19,540	4.5
308B2	Alford silt loam, 1 to 4 percent slopes, eroded	1,920	.4
308C2	Alford silt loam, 4 to 10 percent slopes, eroded	13,805	3.2
308C3	Alford silty clay loam, 4 to 10 percent slopes, severely eroded	17,245	4.0
308D2	Alford silt loam, 10 to 18 percent slopes, eroded	5,025	1.2
308F3	Alford silty clay loam, 18 to 40 percent slopes, severely eroded	1,530	.4
H308C	Alford soils, Karst, 4 to 7 percent slopes	660	.1
H308D	Alford soils, Karst, 7 to 15 percent slopes	2,745	.6
H308F	Alford complex, 15 to 30 percent slopes	2,790	.6
331	Haymond silt loam	835	.2
333	Wakeland silt loam	33,970	7.9
338A	Hurst silt loam, 0 to 2 percent slopes	1,675	.4
338B2	Hurst silt loam, 2 to 5 percent slopes, eroded	1,705	.4
338C2	Hurst silty clay loam, 5 to 10 percent slopes, eroded	3,150	.7
S338B	Hurst silt loam, 1 to 4 percent slopes, sandy substratum	630	.1
386B	Downs silt loam, 2 to 4 percent slopes	1,520	.4
386C2	Downs silt loam, 4 to 9 percent slopes, eroded	815	.2
407	Udifluvents, loamy	1,625	.4
426	Karnak silty clay	2,515	.6
452	Riley silty clay loam	4,200	1.0
U452	Riley-Urban land complex	6,800	1.6
454A	Iva silt loam, 0 to 2 percent slopes	19,595	4.6
454B	Iva silt loam, 2 to 4 percent slopes	12,265	2.8
454B2	Iva silt loam, 2 to 4 percent slopes, eroded	1,950	.5
474	Piasa silt loam	17,030	4.0
533	Urban land	11,510	2.7
570B	Martinsville loam, 1 to 7 percent slopes	1,200	.3
619	Parkville silty clay	1,145	.3
620A	Darmstadt silt loam, 0 to 2 percent slopes	6,375	1.5
620B2	Darmstadt silt loam, 2 to 4 percent slopes, eroded	10,345	2.4
620C3	Darmstadt silty clay loam, 4 to 10 percent slopes, severely eroded	5,480	1.3
801C	Orthents, silty, 3 to 10 percent slopes	1,200	.3
801G	Orthents, silty, 30 to 60 percent slopes	14,900	3.5
802	Orthents, loamy	2,075	.5
922C3	Alford-Hurst silty clay loams, 4 to 7 percent slopes, severely eroded	580	.1
922D3	Alford-Hurst silty clay loams, 7 to 15 percent slopes, severely eroded	780	.2
962E3	Sylvan-Bold silt loams, 15 to 30 percent slopes, severely eroded	8,065	1.9

TABLE 3.—*Acreage and proportionate extent of the soils*—Continued

Map symbol	Soil name	Acres	Percent
962G	Sylvan-Bold silt loams, 30 to 60 percent slopes	835	0.2
U962F	Sylvan-Bold-Urban land complex, 25 to 60 percent slopes	230	.1
995	Piasa-Herrick silt loams	645	.1
999E3	Alford-Hickory complex, 12 to 18 percent slopes, severely eroded	7,245	1.7
999F3	Alford-Hickory complex 18 to 30 percent slopes, severely eroded	7,430	1.7
	Borrow area	80	(1)
	Marsh	920	.2
	Quarries	715	.2
	Sanitary landfill	510	.1
	Sewage lagoons	195	(1)
	Water	6,037	1.4
	Total	430,592	100.0

[1] Less than 0.05 percent.

variable in size and are irregular in shape. This soil has less than 7 inches of the original surface layer remaining. This is mixed with material from the upper part of the subsoil in plowed areas, and here the plow layer is brown to yellowish brown, very friable silt loam.

Included with this soil in mapping are some areas of gently sloping and strongly sloping soils, and a few small areas of somewhat poorly drained soils. Also included are small areas of Alford soils that have a surface layer more than 7 inches thick; these areas commonly are wooded or are on ridgetops. There are also some small areas of severely eroded Alford soils that have a surface layer less than 3 inches thick; these soils have more clay.

Runoff is moderate. The hazard of erosion is generally slight, but it is moderate in some areas of concentrated runoff. When cultivated or manipulated, this soil is subject to severe erosion and surface crusting. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIIe–1; woodland group 1o.

308D2—Alford silt loam, 10 to 18 percent slopes, eroded. This moderately steep soil is mainly in and around watercourses and on the sides of ridges. Individual areas are generally long, are variable in size, and are irregular in shape. This soil has less than 7 inches of the original surface layer remaining. The surface layer is yellowish brown. The total thickness of the surface layer and subsoil is about 30 inches.

Included with this soil in mapping are small, mostly wooded areas of soils that have more than 7 inches of the original surface layer remaining and areas of sloping Alford soils. Also included are some areas of soils that have gray and dark gray layers within 18 inches of the surface. These gray layers are seepy during wet periods.

Runoff is moderate, and the hazard of erosion is moderately severe. Seepy spots near areas of gray spots are not uncommon during wet periods. Slope and seepy areas are limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IVe–2; woodland group 1r.

308C3—Alford silty clay loam, 4 to 10 percent slopes, severely eroded. This sloping soil is mainly in and around watercourses. Individual areas are generally long, are variable in size, and are irregular in shape. This soil has less than 3 inches of the original surface layer remaining. Because of erosion, the present surface layer is yellowish brown light silty clay loam that has a high clay content.

Included with this soil in mapping are small areas of soils that have more than 3 inches of the original surface layer remaining; these soils are brown silt loam. Also included are some small areas of gently sloping and strongly sloping soils and areas of high-sodium soils, which are shown by a spot symbol on the soil map. A few small areas of somewhat poorly drained soils are also included.

Runoff is moderate. The hazard of erosion is generally slight, but it is moderate in some areas of concentrated runoff. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIIe–2; woodland group 1o.

308F3—Alford silty clay loam, 18 to 40 percent slopes, severely eroded. This steep to very steep soil is mainly in areas along watercourses and in the highly dissected areas in the southern and eastern parts of the county. Individual areas are relatively large to small and are irregular in shape. The surface layer is less than 3 inches thick. It is mixed with material from the upper part of the subsoil in plowed areas, and here the surface layer is yellowish brown and has more clay in the upper 8 inches than in uneroded Alford soils.

Included with this soil in mapping are small areas of soils where the depth to the underlying material is less than 18 inches and a few small, wooded areas of soils where the surface layer is essentially uneroded. Also included are areas of soils where erosion has removed the surface layer and subsoil and exposed the silty underlying material, which is high in lime (calcareous) in some places.

Runoff is rapid, and the hazard of erosion is severe. Slope is a limitation to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Most areas of this soil have

been cleared and are cultivated. Because of slope and the hazard of erosion, this soil is better suited to pasture and woodland than to most other uses. Management group VIe–1; woodland group 1r.

H308F—Alford complex, 15 to 30 percent slopes. This complex consists of steep sides of sinkholes and narrow, gently sloping ridges between the sinkholes. The steep soils are mainly on the sides of sinkholes. This complex is in all parts of the county where sinkholes are too common to map or indicate individually. Areas are relatively small, are variable in size, and are irregular in shape. The soils have less than 3 inches of the original surface layer remaining. This is mixed with material from the upper part of the subsoil in plowed areas, and the plow layer is yellowish brown silty clay loam.

Included with these soils in mapping are some small areas, mainly sinkholes, that are strongly sloping or moderately steep. Also included are some small, mostly wooded areas of soils that have more than 3 inches of the original surface layer remaining.

Runoff is moderately rapid, and the hazard of erosion is severe. Slope is a limitation to the use of these soils. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Open sinkholes are also a concern. Because of slope and the hazard of erosion, this complex is well suited to pasture and woodland. Management group VIe–1; woodland group 1r.

H308C—Alford soils, Karst, 4 to 7 percent slopes. This complex consists of sloping sides of sinkholes and narrow, gently sloping ridges between sinkholes. The sloping soils are mainly on the sides of sinkholes. This complex is on uplands, where sinkholes are too common to map or indicate individually. Areas are relatively large, are variable in size, and irregular in shape. The soils have less than 3 inches of the original surface layer remaining. The surface layer is mixed with the upper part of the subsoil in some plowed areas and is yellowish brown silty clay loam. In other areas the surface layer is silt loam.

Included with these soils in mapping are some sinkholes that have strongly sloping sides. Also included are some small, mostly wooded areas that have more than 3 inches of the original surface layer remaining.

Runoff is medium, and the hazard of erosion is moderate to severe. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Open sinkholes in these soils are also a concern. These soils are suited to most crops grown in the county. Management group IIIe–1; woodland group 1o.

H308D—Alford soils, Karst, 7 to 15 percent slopes. This complex consists of strongly sloping soils that are mainly on sides of sinkholes and of gently sloping soils on narrow ridges between sinkholes. This complex is on uplands, where sinkholes are too common to map or indicate individually. Areas are relatively large in size and are irregular in shape. In some places the surface layer is silt loam; in other places, where the subsoil is mixed in plowing, it is yellowish brown silty clay loam.

Included with these soils in mapping are some sinkholes that have moderately sloping and moderately steep sides. Also included are some small, mostly wooded areas of soils that have more than 3 inches of the original surface layer remaining.

Runoff is moderate, and the hazard of erosion is moderately severe to severe. Slope is a limitation to the use of these soils. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Open sinkholes in these soils are also a concern. Because of slope and the hazard of erosion, these soils are poorly suited to corn and soybeans. They are suited to small grain and are well suited to hay. Management group IVe–1; woodland group 1o.

999E3—Alford-Hickory complex, 12 to 18 percent slopes, severely eroded. These moderately steep soils are along watercourses and in the highly dissected areas that drain into the Kaskaskia River basin.

This complex is about 60 percent Alford soils and 40 percent Hickory soils. Alford soils have a surface layer of silty clay loam and have no glacial material in the subsoil or the upper part of the underlying material. Hickory soils have a surface layer of clay loam and formed in glacial material. Alford soils are on the upper part of the slope, and Hickory soils are on the lower part of the slope.

Runoff is rapid. The hazard of erosion is severe in cultivated areas. Slope is a limitation to the use of these soils. Controlling erosion and maintaining tilth and fertility are the main concerns of management. Many areas of these soils have been cleared and are used for corn, soybeans, wheat, and hay. These soils are better suited to pasture or woodland than to cultivated crops. Management group VIe–1; woodland group 1r.

999F3—Alford-Hickory complex, 18 to 30 percent slopes, severely eroded. These steep soils are along watercourses and in the highly dissected areas that drain into the Kaskaskia River basin.

This complex is about 50 percent Alford soils and 50 percent Hickory soils. Alford soils have a surface layer of silty clay loam and have no glacial material in the subsoil. Hickory soils have a surface layer of clay loam and formed in glacial material. Alford soils are on the upper part of the slope, and Hickory soils are on the lower part of the slope.

Runoff is rapid. The hazard of erosion is severe. Slope is a limitation to the use of these soils. Controlling erosion and maintaining tilth and fertility are the main concerns of management. Many areas of this complex remain in woods, but some areas have been cleared. Because of the hazard of erosion, the cleared areas have become idle. This complex is better suited to woodland than to most other uses. Management group VIe–1; woodland group 1r.

922C3—Alford-Hurst silty clay loams, 4 to 7 percent slopes, severely eroded. These sloping soils are on terraces in and around watercourses that drain into the Kaskaskia River.

This complex is about 60 percent Alford soils and 40 percent Hurst soils. Alford soils are lighter brown and have less clay than Hurst soils. Hurst soils appear scabby when plowed. Alford soils are on the upper part of the slope, and Hurst soils are on the lower part of the slope.

Included with these soils in mapping are a few areas of moderately well drained soils on the slopes slightly above Hurst soils. Also included are areas of poorly drained clayey soils on lower slopes.

Runoff is rapid. Seasonal wetness, seepage, and

slopes are limitations to the use of these soils. Controlling erosion and maintaining tilth and fertility are the main concerns of management. All areas of these soils are cultivated. The soils are suited to all crops commonly grown in the county, but they are better suited to small grain and hay than to most other crops. Management group IVe–1; woodland group 3o.

922D3—Alford-Hurst silty clay loams, 7 to 15 percent slopes, severely eroded. These strongly sloping soils are on terraces in and around watercourses that drain into the Kaskaskia River.

This complex is about 50 percent Alford soils and 50 percent Hurst soils. Alford soils are lighter brown and have less clay than Hurst soils. Hurst soils are scabby and are locally referred to as gumbo. Alford soils are on the upper part of the slope, and Hurst soils are on the lower part of the slope. At a place on the slope where these two soils meet, there is generally a gray contact layer that is seepy during wet periods.

Included with these soils in mapping are a few small areas where Alford soils cover the entire slope. Also included are areas where outwash sand is on the lower part of the slope below the Hurst soils.

Runoff is rapid. Seasonal wetness, seepage, and slopes are limitations to the use of these soils. Controlling erosion and maintaining tilth and fertility are concerns of management. Nearly all areas of these soils are cultivated, but a few small areas are in woods. If these soils are used for corn, soybeans, or wheat, the hazard of erosion is severe. These soils are generally better suited to pasture or woodland than to cultivated crops. Management group VIe–2; woodland group 3o.

Atterberry Series

The Atterberry series consists of nearly level, somewhat poorly drained soils that formed in silty material under grasses and a hardwood forest. These soils are mainly on uplands on the border between the prairie and the woodland.

In a representative profile the surface layer is very dark gray and dark gray silt loam about 13 inches thick. The subsurface layer is gray silt loam about 6 inches thick. The upper 25 inches of the subsoil is mainly mixed grayish brown, brown, and yellowish brown silty clay loam; the lower 4 inches is gray silt loam. Brownish yellow mottles are common in the lower 11 inches. The subsoil has distinct, dark gray to very dark gray films on ped faces. The underlying material is mottled, mixed gray and light brownish gray silt loam.

Organic-matter content is moderate. Permeability is moderately slow, and water capacity is high.

Atterberry soils are well suited to farming. They are well suited to open-land and woodland wildlife and are suited to wetland wildlife. Most areas of these soils are used for corn, soybeans, and wheat. Limitations for many nonfarm uses are moderate or severe.

Representative profile of Atterberry silt loam, 0 to 3 percent slopes, in a cultivated field, 48 feet north and 1,800 feet west of the southeast corner of sec. 11, T. 2 N., R. 6 W.:

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) when dry; weak fine crumb structure; friable; slightly acid; abrupt smooth boundary.

A12—8 to 13 inches; dark gray (10YR 4/1) silt loam; weak medium crumb structure parting to weak fine crumb; friable; slightly acid; gradual smooth boundary.

A2—13 to 19 inches; gray (10YR 5/1) silt loam; few fine faint brownish yellow (10YR 6/6) and dark gray (10YR 4/1) mottles; moderate coarse crumb structure; friable; medium acid; abrupt smooth boundary.

B21t—19 to 23 inches; grayish brown (10YR 5/2) light silty clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; thick nearly continuous dark gray (10YR 4/1) clay and organic films on ped faces; medium acid; gradual smooth boundary.

B22t—23 to 30 inches; brown (10YR 5/3) silty clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles and many coarse faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; thick continuous very dark gray (10YR 3/1) clay and organic films on ped faces; medium acid; gradual smooth boundary.

B23t—30 to 37 inches; brown (10YR 5/3) silty clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles and many coarse faint grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; thick continuous very dark gray (10YR 3/1) clay and organic films on ped faces; slightly acid; gradual smooth boundary.

B24t—37 to 44 inches; grayish brown (10YR 5/2) light silty clay loam; many medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm to friable; patchy very dark gray (10YR 3/1) and dark gray (10YR 4/1) clay and organic films on ped faces; slightly acid; gradual smooth boundary.

B3—44 to 48 inches; gray (10YR 5/1) heavy silt loam; common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure; friable; dark gray (10YR 4/1) pore fillings; neutral; gradual smooth boundary.

C—48 to 76 inches; mixed gray (10YR 5/1), light brownish gray (10YR 6/2), pale brown (10YR 6/3), and yellowish brown (10YR 5/6) silt loam; massive; friable; numerous very dark gray (10YR 3/1) pore fillings; neutral.

The Ap horizon is very dark gray and black and is 8 to 10 inches thick. The upper part of the B horizon ranges from grayish brown to dark grayish brown and has brownish yellow mottles, and the lower part is mottled, grayish brown, dark grayish brown, brown, gray, yellowish brown, or dark yellowish brown silty clay loam. The B horizon is strongly acid to neutral. The C horizon is at a depth of 40 to 60 inches. It is medium acid to mildly alkaline.

Atterberry soils formed in the same kind of material in which Muscatine, Downs, and Fayette soils formed and are in similar positions on the landscape. Atterberry soils are somewhat poorly drained, whereas Downs and Fayette soils are moderately well drained to well drained. Atterberry soils have a dark colored surface layer that is not so thick as that of Muscatine soils.

61A—Atterberry silt loam, 0 to 3 percent slopes. This nearly level soil is in areas that border shallow watercourses. Individual areas are relatively small in size and are irregular in shape.

Included with this soil in mapping are some small areas of light colored, gently sloping Fayette soils. Also included are small areas of Muscatine soils.

Runoff is slow. Seasonal wetness is a limitation. Maintaining fertility and tilth is the main concern of management. This soil is well suited to most crops grown in the county. Management group I–1; woodland group 2o.

Beaucoup Series

The Beaucoup series consists of nearly level, poorly drained soils that formed in silty sediment under grasses and a hardwood forest. These soils are mainly on bottom lands in broad river valleys.

In a representative profile the surface layer is very dark grayish brown and very dark gray silty clay loam about 18 inches thick. The subsoil is mottled, dark gray silty clay loam in the upper part and mottled, gray silty clay loam in the lower part. It has very dark gray and gray films on ped faces, and it is stratified in the lower part. The underlying material is grayish brown silty clay loam that has thin strata of silt loam.

Organic-matter content is high. Permeability is moderate, and available water capacity is high.

Beaucoup soils are suited to most crops grown in the county. They are fairly well suited to open-land and woodland wildlife and are well suited to wetland wildlife. Most areas of these soils are used for corn, soybeans, and wheat. Limitations for most nonfarm uses are severe because of poor drainage, ponding, and flooding.

Representative profile of Beaucoup silty clay loam, in a cultivated field, 381 feet east and 1,800 feet south of the northwest corner of sec. 6, T. 2 N., R. 8 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam; cloddy; friable to firm; thin yellowish brown (10YR 5/4) strata; slightly acid; abrupt smooth boundary.

A12—8 to 18 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine and medium subangular blocky structure; friable to firm; neutral; clear smooth boundary.

B21g—18 to 23 inches; dark gray (10YR 4/1) silty clay loam; few fine faint brown (7.5YR 4/4) mottles and common medium faint olive (5Y 5/3) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; friable to firm; continuous very dark gray (10YR 3/1) clay films on ped faces; few small iron concretions; neutral; clear smooth boundary.

B22g—23 to 32 inches; gray (10YR 5/1) silty clay loam; common fine distinct olive (5Y 4/3) mottles and few fine prominent strong brown (7.5YR 5/6) mottles; weak fine prismatic structure parting to moderate to strong medium subangular blocky; firm; continuous dark gray (10YR 4/1) clay films on ped faces; neutral; clear smooth boundary.

B3g—32 to 42 inches; gray (10YR 5/1) silty clay loam that has thin strata of silt loam; common fine distinct dark grayish brown (2.5Y 4/2) mottles and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure; friable to firm; discontinuous gray (5Y 5/1) clay films on ped faces; mildly alkaline; clear smooth boundary.

Cg—42 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam that has thin strata of silt loam; common fine faint dark grayish brown (2.5Y 4/2) mottles and common fine distinct olive (5Y 4/3) mottles; massive; friable; moderately alkaline.

The A horizon ranges from very dark grayish brown to black silty clay loam and is 10 to 24 inches thick. It is slightly acid or neutral. The B horizon is commonly grayish brown to gray, but in places, it is very dark gray or dark gray in the upper part. It is slightly acid to mildly alkaline. The B3g and C horizons are silty clay loam and have thin strata of silt, silt loam, silty clay, or fine sand. The C horizon is at a depth of 40 to 60 inches. It is mildly alkaline to moderately alkaline and is calcareous.

Beaucoup soils are in positions on the landscape similar to those of Darwin and Dupo soils. Beaucoup soils have less clay in all layers than Darwin soils. They have a surface layer of dark colored silty clay loam, whereas Dupo soils have a surface layer of light colored silt loam.

70—Beaucoup silty clay loam. This nearly level soil is in depressions on large bottom lands. Individual areas are relatively large in size and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of soils that have an overburden of light colored silt loam as much as 12 inches thick and small areas of soils that are very dark gray or black to a depth of more than 24 inches. Also included are a few areas of soils that have snail shells in the upper part of the underlying material and are calcareous in all layers. These areas are shown by a spot symbol on the soil map.

This soil is suited to most crops grown in the county, but it needs drainage for maximum crop production. Wetness and flooding are limitations. Maintaining tilth and fertility is a major concern of management. In some places, the hazard of Johnsongrass infestation is serious. Management group IIw–2; woodland group 2w.

Bold Series

The Bold series consists of steep, well drained soils that formed in very thick silty material (loess) under a hardwood forest. These soils are mainly on bluffs on uplands in the western part of the county.

In a representative profile the surface layer is very dark grayish brown silt loam about 3 inches thick. The underlying material is yellowish brown silt loam in the upper 13 inches and brownish yellow silt loam in the lower part.

Organic-matter content is low. Permeability is moderate, and available water capacity is high.

Bold soils are unsuited to farming. They are well suited to open-land and woodland wildlife. Most areas of these soils are in woodland. Limitations for many nonfarm uses are severe because of slope.

Representative profile of Bold silt loam, from a wooded area of Sylvan-Bold silt loams, 30 to 60 percent slopes, 1,850 feet west and 1,825 feet south of the northeast corner of sec. 24, T. 2 N., R. 9 W.:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam; moderate to strong fine granular structure; friable; moderately alkaline; abrupt smooth boundary.

C1—3 to 16 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; moderately alkaline; gradual smooth boundary.

C2—16 to 60 inches; brownish yellow (10YR 6/6) silt loam; massive; friable; strongly alkaline; violent effervescence.

The A horizon is very dark grayish brown and dark brown and is 3 to 6 inches thick. The C horizon ranges from light brownish yellow to yellowish brown.

Bold soils formed in the same kind of material in which Sylvan and Fayette soils formed and are in similar positions on the landscape. Bold soils are calcareous and lack the thin silty clay loam subsoil that Sylvan soils have and the thick, acid silty clay loam subsoil that Fayette soils have.

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

Bonnie Series

The Bonnie series consists of nearly level, poorly drained soils that formed in silty material under a hardwood forest. These soils are on bottom lands. They

are mainly in large areas on the Kaskaskia River flood plain.

In a representative profile the surface layer is mottled, dark grayish brown silt loam about 3 inches thick. The underlying material is mottled, dark gray and grayish brown silt loam in the upper part and mottled, gray silt loam in the lower part.

Organic-matter content is moderately low. Permeability is slow, and available water capacity is high. Runoff is slow to ponded.

Bonnie soils are suited to farming, but because of flooding they are better suited to late-seeded crops than to other crops. They are fairly well suited to open-land and woodland wildlife and are well suited to wetland wildlife. Many areas of these soils are used for corn and soybeans, and some areas are in hardwood forest. Limitations for many nonfarm uses are severe.

Representative profile of Bonnie silt loam, in hardwood forest, 500 feet south and 30 feet west of the northeast corner of sec. 24, T. 1 S., R. 6 W.:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; strongly acid; clear smooth boundary.

C1g—3 to 11 inches; mixed dark gray (10YR 4/1) and grayish brown (10YR 5/2) silt loam; common fine faint brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; very strongly acid; clear smooth boundary.

C2g—11 to 23 inches; gray (10YR 6/1) silt loam; many medium prominent brown (7.5YR 4/4) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; common fine iron concretions; very strongly acid; gradual smooth boundary.

C3g—23 to 41 inches; gray (10YR 6/1) silt loam; many medium distinct brown (7.5YR 4/4) mottles; massive; friable; common medium iron concretions; dark gray (10YR 4/1) krotovinas; very strongly acid; gradual smooth boundary.

C4g—41 to 60 inches; gray (10YR 6/1) heavy silt loam; few medium distinct brown (7.5YR 4/4) mottles; massive; friable; common medium iron concretions; very strongly acid.

The Ap horizon, where present, ranges from gray to dark grayish brown silt loam and is 6 to 10 inches thick. The C horizon ranges from light gray to grayish brown silt loam and has common brownish yellow to brown mottles. The C horizon is very strongly acid or strongly acid.

Bonnie soils are in similar positions on the landscape as Karnak soils. Bonnie soils have less clay in all horizons than those soils.

108—Bonnie silt loam. This nearly level soil is mainly on the broad bottom lands of the Kaskaskia River flood plain. They are near poorly drained Okaw soils but are generally at a somewhat lower elevation. Individual areas are relatively large and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of somewhat poorly drained Wakeland soils and small areas of soils that are less acid than this Bonnie soil. Also included are some small areas of soils that have a layer of silty clay loam within a depth of 48 inches and small areas of soils that have a thin surface layer of silty clay loam less than 15 inches thick.

Runoff is slow to ponded. Seasonal wetness and flooding are limitations to the use of this soil. Maintaining tilth and fertility is a major concern of management. This soil is suited to late-seeded crops. Management group IIIw–4; woodland group 2w.

Darmstadt Series

The Darmstadt series consists of nearly level to sloping, somewhat poorly drained soils that are high in sodium. These soils formed in silty material under a hardwood forest. They are on uplands and terraces in the western and southern parts of the county.

In a representative profile the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is light brownish gray silt loam about 3 inches thick. The upper 10 inches of the subsoil is brown and pale brown silty clay loam that has grayish brown, brownish yellow, and yellowish brown mottles; the middle 14 inches is light brownish gray silty clay loam that has brown, dark gray, and yellowish brown mottles; and the lower 4 inches is light gray light silty clay loam that has yellowish brown mottles. The underlying material is light gray silt loam.

Organic-matter content is low. Permeability is slow to very slow, and available water capacity is low. Runoff is medium to rapid.

Darmstadt soils are suited to fairly well suited to farming. They are better suited to wheat than to soybeans or corn because of poor physical condition. They are suited to open-land wildlife in eroded areas, but in severely eroded areas, suitability is only fair. They are unsuited to woodland and wetland wildlife. Darmstadt soils are generally used for farming. Limitations for many nonfarm uses are severe because of permeability and poor physical and chemical conditions.

Representative profile of Darmstadt silt loam, 0 to 2 percent slopes, in a cultivated area, 1,202 feet west and 84 feet south of the northeast corner of sec. 9, T. 2 S., R. 8 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak thick platy structure parting to weak very fine granular; friable; few small black (10YR 2/1) iron and manganese concretions; neutral; abrupt smooth boundary.

A2—8 to 11 inches; light brownish gray (10YR 6/2) and some grayish brown (10YR 5/2) silt loam; weak thick platy structure parting to weak fine subangular blocky; friable; numerous black (10YR 2/1) iron and manganese concretions; neutral; abrupt smooth boundary.

B1—11 to 16 inches; brown (10YR 5/3) silty clay loam; moderate medium faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to moderate medium angular blocky; friable to firm; thin discontinuous grayish brown (10YR 5/2) clay films on ped faces; very strongly acid; gradual smooth boundary.

B21t—16 to 21 inches; pale brown (10YR 6/3) silty clay loam; many fine distinct grayish brown (10YR 5/2), brownish yellow (10YR 6/6), and yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to strong medium angular blocky; firm; thin discontinuous gray (10YR 5/1) clay films on ped faces; medium acid; gradual smooth boundary.

B22t—21 to 27 inches; mixed pale brown (10YR 6/3) and light brownish gray (10YR 6/2) heavy silty clay loam; many coarse distinct strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure; firm; thin discontinuous gray (10YR 5/1) clay films on ped faces; slightly acid; gradual smooth boundary.

B23t—27 to 35 inches; light brownish gray (10YR 6/2) silty clay loam; few medium prominent dark gray (10YR 4/1), dark yellowish brown (10YR 4/4), and light yellowish brown (10YR 6/4) mottles; weak coarse prismatic structure; firm; common fine black

(10YR 2/1) and very dark gray (10YR 3/1) root pore fillings; common iron and manganese concretions; neutral; clear smooth boundary.

B3—35 to 39 inches; light gray (10YR 7/1) light silty clay loam; few coarse distinct yellowish brown (10YR 5/6) iron mottles; weak coarse prismatic structure; friable; thin discontinuous gray (10YR 5/1) coats on ped faces; mildly alkaline; abrupt smooth boundary.

C1—39 to 44 inches; light gray (10YR 7/1) silt loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) iron mottles and several iron bands; massive; mildly alkaline; abrupt smooth boundary.

C2—44 to 62 inches; light gray (10YR 7/1) silt loam; many coarse distinct yellowish brown (10YR 5/6 and 5/8) iron mottles and iron bands; massive; many black (10YR 2/1) spots and stains; moderately alkaline; gradual smooth boundary.

C3—62 to 67 inches; light gray (10YR 7/1) silt loam; many coarse distinct yellowish brown (10YR 5/6) iron bands and mottles; massive; few black (10YR 2/1) manganese concretions; moderately alkaline.

The Ap horizon ranges from very dark grayish brown to grayish brown and is 4 to 12 inches thick. The A2 horizon ranges from light brownish gray to dark brown and is 3 to 8 inches thick. The upper part of the B horizon ranges from brown to light brownish gray, and the lower part ranges from pale brown to light gray and has grayish brown, yellowish brown, brownish yellow, strong brown, light yellowish brown, or dark gray mottles. The B horizon is strongly acid to strongly alkaline in the upper part and mildly alkaline to strongly alkaline in the lower part. The C horizon is at a depth of 38 to 60 inches. It is mildly alkaline to strongly alkaline.

Darmstadt soils formed in the same kind of material as Iva, Herrick, and Piasa soils and are in similar positions on the landscape. Darmstadt soils are lighter colored than Herrick soils. They are alkaline in a part of the B horizon and are alkaline in the underlying material, whereas the Herrick and Iva soils are acid throughout. Darmstadt soils are somewhat poorly drained, and Piasa soils are poorly drained.

620A—Darmstadt silt loam, 0 to 2 percent slopes. This nearly level soil is in areas that are slightly higher than the surrounding soils. Individual areas are large or small and are uniform or irregular in shape. In small areas these soils form an intricate pattern with soils that are not affected by sodium. This soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas of darker colored, acid Herrick soils and poorly drained Piasa soils. Also included are some areas of soils where the surface layer is less than 3 inches thick and has exposed, light gray, strongly alkaline areas called slick spots (fig. 5).

Available water capacity is low, and the hazard of frost heave is moderate. Seasonal wetness, slow permeability, and presence of sodium salts are limitations to the use of this soil. Minimizing frost heave and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county, but is better suited to wheat and soybeans than to other crops. Plants are affected by low available water capacity during relatively short dry periods. Management group IIIs–2; woodland group 3t.

620B2—Darmstadt silt loam, 2 to 4 percent slopes, eroded. This gently sloping soil is generally in and around watercourses and on side slopes that break from broad, nearly level areas. Individual areas are relatively small and are irregular in shape. This soil has less than 7 inches of the original surface layer remaining. The surface layer is light yellowish brown to grayish brown.

Included with this soil in mapping are some small areas of light colored, somewhat poorly drained Iva soils and of well drained Alford soils. Very small areas of severely eroded Darmstadt silty clay loam are also included. These severely eroded areas are called slick spots.

Figure 5.—**Area of Darmstadt soil showing lighter colored areas, or slick spots on the surface.**

Available water capacity is low, and the hazard of frost heave is moderate. Seasonal wetness, slow permeability, and the presence of sodium salts are limitations to the use of this soil. Minimizing frost heave and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county, but is better suited to wheat and soybeans than to other crops. Plants are affected by low available water capacity during relatively short dry periods. Management group IIIs–3; woodland group 3t.

620C3—Darmstadt silty clay loam, 4 to 10 percent slopes, severely eroded. This sloping to strongly sloping soil is in and around watercourses and on slopes that break into bottom lands. The areas adjacent to the bottom lands are relatively narrow and long, and the areas in and around watercourses are small and are irregular in shape. This soil has less than 3 inches of the original surface layer remaining. The surface layer is mottled light brownish gray and yellowish brown silty clay loam.

Included with this soil in mapping are some small areas of Darmstadt soils that have more than 3 inches of the original surface layer remaining and small areas of gently sloping Darmstadt soils. Also included are small areas of acid, light colored, well drained Alford soils. The severely eroded areas of Darmstadt soils are generally called slick spots.

Available water capacity is low, and the hazard of frost heave is moderate. Slow permeability and the presence of excess sodium salts are limitations to the use of this soil. Controlling erosion, minimizing frost heave, and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county, but is better suited to small grain and hay than to other crops. Plants are affected by low available water capacity during relatively short dry periods. Management group IVe–3; woodland group 3t.

Darwin Series

The Darwin series consists of nearly level, poorly drained soils that formed in clayey alluvial sediment under grasses and trees that thrive in wet conditions. These soils are mainly on flood plains of the American Bottoms.

In a representative profile the surface layer is black silty clay about 12 inches thick. The subsoil is silty clay about 50 inches thick. The upper part of the subsoil is very dark gray and has olive brown mottles, and the lower part is dark gray to gray and has dark brown, yellowish brown, and olive brown mottles.

Organic-matter content is high. Permeability is very slow, and available water capacity is moderate.

Darwin soils are suited to farming if they are drained. Drained areas are well suited to open-land wildlife, are suited to woodland wildlife, and are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife and woodland wildlife and are suited to wetland wildlife. These soils are suited to woodland. Most areas of these soils have been cleared and are used for corn and wheat. Few areas have been urbanized (fig. 6). Limitations for most nonfarm uses are severe.

Representative profile of Darwin silty clay, in a cultivated field; State Plane Coordinates, 677,200 feet north and 490,550 feet east (Illinois west zone), sec. 22 (unsurveyed) T. 1 N., R. 10 W.:

A1—0 to 12 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) when dry; moderate medium granular structure parting to fine subangular blocky; firm; slightly acid; clear smooth boundary.

B1g—12 to 17 inches; very dark gray (5Y 3/1) silty clay; few fine faint gray (10YR 5/1) mottles and common fine faint olive brown (2.5Y 4/4) mottles; moderate medium angular blocky structure; firm; black (10YR 2/1) ped exteriors; slightly acid; clear smooth boundary.

B21g—17 to 28 inches; dark gray (5Y 4/1) silty clay; many fine distinct dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) mottles; weak fine angular blocky structure; firm; few very dark gray (10YR 3/1) coats; slightly acid; clear smooth boundary.

B22g—28 to 38 inches; gray (5Y 5/1) silty clay; few fine distinct olive brown (2.5Y 4/4) mottles; weak fine angular blocky structure; firm; few dark gray (5Y 4/1) coats; slightly acid; gradual smooth boundary.

B23g—38 to 62 inches; gray (5Y 5/1) silty clay; few fine distinct olive brown (2.5Y 4/4) mottles; moderate medium and fine angular blocky structure; firm; gray (5Y 5/1) and dark gray (5Y 4/1) smooth ped exteriors; neutral.

The A horizon ranges from very dark gray to black and is 10 to 20 inches thick. The B horizon is very dark gray grading to gray as depth increases and has olive brown, dark brown, and dark yellowish brown mottles. It is silty clay to clay and is slightly acid to mildly alkaline. The C horizon is at a depth of 30 to 65 inches. It is neutral to moderately alkaline.

Darwin soils formed in the same kind of material in which Karnak and Beaucoup soils formed and are in similar positions on the landscape. Darwin soils have a thicker dark surface layer than Karnak soils and are less acid. They have more clay in the profile than Beaucoup soils.

71—Darwin silty clay. This nearly level soil is in depressions on the American Bottoms and on the Kaskaskia River flood plain. Individual areas of this soil are large and uniform in shape where it is associated with Darwin variant soils, and they are relatively small and narrow where it is associated with Riley and Landes soils. Slopes are 0 to 1 percent. This soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas of soils that are high in lime (calcareous) throughout the profile and in some places contain shells. These areas are shown by a spot symbol on the soil map. Also included in a large depression east of Cahokia are areas of soils that have a layer, within a depth of 60 inches, that has the appearance of a buried soil. There are also some areas of soils that are black to a depth of 22 inches, and areas of soils that have a surface layer that is thinner than that of this Darwin soil.

Very slow permeability, wetness, and high clay content are limitations to the use of this soil. Controlling flooding and ponding and maintaining fertility and tilth are the main concerns of management. The hazard of Johnsongrass infestation is serious in many areas. A system of surface drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIIw–5; woodland group 3w.

U71—Darwin-Urban land complex. This complex consists of clayey, nearly level Darwin soils that have

Figure 6.—Area of Darwin silty clay converted to nonfarm uses. Ponding is a limitation on this soil.

been partly disturbed by urban development. Slopes are 0 to 2 percent. Most areas are in former sloughs and in ponded areas on flood plains of the American Bottoms. Vegetation is a mixture of lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Darwin soils, 20 percent Urban land, and 30 percent areas that have been modified by covering Darwin soils with fill or by grading. A Darwin soil in an undisturbed area of this complex has the profile described as representative of the series. Most of the urban land is covered by buildings and pavement. In modified areas the fill material is generally clayey and comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are a few areas of Darwin variant soils and Parkville silty clay.

Wetness, clayey texture, slow to very slow permeability, and high shrink-swell potential severely limit these soils for many urban uses. Excavations generally fill with water in winter and spring. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

Darwin Variant

The Darwin variant consists of nearly level, poorly drained soils that formed in clayey alluvial sediment under grasses and trees that thrive in wet conditions. These soils are mainly on the flood plains of the American Bottoms.

In a representative profile the surface layer is very dark gray silty clay about 11 inches thick. The subsoil is grayish brown silty clay about 25 inches thick, and it has dark brown mottles. The subsoil becomes lighter in texture as depth increases. The underlying material is stratified very fine sand, fine sand, and medium sand.

Organic-matter content is high. Permeability is very slow to a depth of 36 inches and is rapid below this depth. Available water capacity is moderate.

Darwin variant soils are suited to farming if drained. Drained areas are well suited to open-land wildlife, are suited to woodland wildlife, and are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land and woodland wildlife and are suited to wetland wildlife. These soils are suited to woodland. Most areas of these soils have been cleared and are used for corn and wheat. A few areas have been urbanized. Limitations for most nonfarm uses are severe.

Representative profile of Darwin Variant silty clay, 330 feet south of the center of sec. 10, T. 1 N., R. 10 W.:

A1—0 to 11 inches; very dark gray (10YR 3/1) silty clay; few fine distinct dark brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to strong medium angular and subangular blocky; firm; mildly alkaline; clear smooth boundary.

B21g—11 to 21 inches; grayish brown (2.5Y 5/2) silty clay; common medium prominent dark brown (7.5YR

4/4) mottles; moderate coarse subangular blocky structure; firm; thick continuous very dark gray (10YR 3/1) films; neutral; clear smooth boundary.

B22g—21 to 27 inches; grayish brown (2.5Y 5/2) silty clay; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure; firm; nearly continuous dark gray (10YR 4/1) films; neutral; clear smooth boundary.

IIB23g—27 to 36 inches; grayish brown (2.5Y 5/2) heavy silty clay loam; common medium prominent dark brown (7.5YR 4/4) mottles; weak medium prismatic structure; friable; patchy dark gray (10YR 4/1) films on vertical faces; neutral; abrupt smooth boundary.

IIC1—36 to 60 inches; mixed grayish brown (2.5Y 5/2) and dark brown (7.5YR 4/4) stratified very fine sand, fine sand, and medium sand; massive; very friable to loose; neutral.

The A horizon ranges from very dark gray to black and is 10 to 20 inches thick. The B horizon is grayish brown, dark gray, or dark grayish brown and has brown, dark brown, and strong brown mottles. It is slightly acid to mildly alkaline. The IIC horizon is at a depth of 30 to 40 inches. The IIC horizon is slightly acid to moderately alkaline.

Darwin variant soils are in positions on the landscape similar to those of Darwin and Parkville soils. Darwin variant soils have sandy materal below a depth of 36 inches, which Darwin soils do not have. Unlike Parkville soils, they have a silty clay B horizon.

V71—Darwin Variant silty clay. This nearly level soil is in depressions on the American Bottoms. Individual areas are large and uniform in shape where they are near Darwin silty clay and relatively small and narrow where they are near Riley and Landes soils. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of Parkville soils that have a sandy substratum within a depth of 30 inches and small areas of soils that have a sandy or loamy substratum below a depth of 60 inches.

Very slow permeability, wetness, and high clay content are the main limitations to the use of this soil. Controlling flooding and ponding and maintaining fertility and tilth are the main concerns of management. The hazard of Johnsongrass infestation is serious in many areas. A system of surface drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIIw–5; woodland group 3w.

Downs Series

The Downs series consists of gently sloping to sloping, well drained soils that formed in silty material under grasses and a hardwood forest. These soils are mainly on the border between the prairie and the woodland.

In a representative profile the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The upper 12 inches of the subsoil is dark brown silt loam grading to brown and dark brown silty clay loam; the middle 11 inches is dark yellowish brown silty clay loam that has faint yellowish brown, grayish brown, and light brownish gray mottles; and the lower 9 inches is mixed grayish brown, yellowish brown, brown, and dark brown light silty clay loam. The underlying material is yellowish brown silt loam that has grayish brown, faint gray, and light gray mottles.

Organic-matter content is moderate. Permeability is moderate, and available water capacity is high. Runoff is medium.

Downs soils are well suited to farming. They are well suited to open-land and woodland wildlife but are unsuited to wetland wildlife. Most areas of these soils are used for row crops and small grain. Limitations for many nonfarm uses are slight.

Representative profile of Downs silt loam, 2 to 4 percent slopes, in a cultivated field, 50 feet east and 550 feet north of the southwest corner of sec. 18, R. 8 W., T. 1 N.:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) when dry; weak thick platy structure parting to weak fine granular; friable; slightly acid; clear smooth boundary.

A1—6 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

A2—9 to 13 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure parting to weak fine and medium granular; friable; slightly acid; abrupt smooth boundary.

B1—13 to 16 inches; dark brown (10YR 3/3) silt loam; moderate fine and medium subangular blocky structure; friable; nearly continuous very dark grayish brown (10YR 3/2) coats on ped faces; slightly acid; clear smooth boundary.

B21t—16 to 25 inches; brown and dark brown (10YR 4/3) silty clay loam; moderate and strong medium subangular blocky structure; friable to firm; nearly continuous very dark grayish brown (10YR 3/2) coats on ped faces; medium acid; clear smooth boundary.

B22t—25 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine faint yellowish brown (10YR 5/6 and 5/8), grayish brown (10YR 5/2, and light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; continuous thin dark grayish brown (10YR 4/2) coats on ped faces; few iron concretions; medium acid; clear smooth boundary.

B3—36 to 45 inches; mixed grayish brown (10YR 5/2), yellowish brown (10YR 5/6 and 5/8), and brown to dark brown (10YR 4/3) light silty clay loam; weak coarse prismatic structure; firm to friable; patchy discontinuous dark grayish brown (10YR 4/2) coats on ped faces; common iron and manganese concretions; slightly acid; clear smooth boundary.

C—45 to 64 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct grayish brown (10YR 5/2) mottles, common fine faint yellowish brown (10YR 5/6 and 5/8) mottles, and few fine faint light gray to gray (10YR 6/1) mottles; massive; friable; common iron and manganese concretions; slightly acid.

The A horizon is very dark grayish brown and very dark brown and is 4 to 14 inches thick. The B horizon ranges from yellowish brown to dark brown in the upper part and from yellowish brown to grayish brown to brown in the lower part. Mottles generally begin below a depth of 24 inches and increase in abundance as depth increases. The B horizon is strongly acid to slightly acid. The C horizon is at a depth of 36 to 48 inches. It is medium acid to neutral.

Downs soils formed in the same kind of material in which Atterberry and Fayette soils formed and are in similar positions on the landscape. Downs soils are well drained, whereas Atterberry soils are somewhat poorly drained. Downs soils have a darker colored surface layer than the light colored Fayette soils.

386B—Downs silt loam, 2 to 4 percent slopes. This gently sloping soil is mainly in and around water-

courses and in areas that are slightly higher than surrounding soils. Individual areas on small knolls are relatively small and are uniform in shape, and areas in and around watercourses are irregular in shape.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry soils; well drained, light colored Fayette soils; and sloping Downs soils. Also included are small areas where, because of erosion, the surface layer is less than 7 inches thick, has a higher clay content, and is lighter than that of uneroded Downs soils.

Runoff is medium, and the hazard of erosion is slight. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to most crops grown in the county. Management group IIe–1; woodland group 1o.

386C2—Downs silt loam, 4 to 9 percent slopes, eroded. This sloping soil is mainly in and around watercourses. Individual areas are relatively small and are irregular in shape. This soil has a profile similar to the one described as representative of the series, but the surface layer is brown to dark brown and, because of erosion, is less than 7 inches thick. Also, it has more clay because it is mixed with material from the upper part of the subsoil.

Included with this soil in mapping are some small areas of gently sloping Downs and areas of Downs soils that have a surface layer more than 7 inches thick. Also included are small areas of light colored, well drained Fayette soils.

Runoff is medium to moderate, and the hazard of erosion is slight to moderate. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to most crops grown in the county. Management group IIIe–1; woodland group 1o.

Dupo Series

The Dupo series consists of nearly level, somewhat poorly drained soils that formed in silty alluvial sediment that is less than 40 inches thick over dark colored, fine textured sediment. These soils formed under forest. They are mainly on flood plains of the Mississippi River.

In a representative profile the surface layer is dark brown silt loam about 10 inches thick. The underlying material is mixed light brownish gray, yellowish brown, and dark yellowish brown silt loam in the upper part and black silty clay (old buried soil) in the lower part.

Organic-matter content is moderately low. Permeability is moderately slow to slow, and available water capacity is high. Runoff is slow.

Dupo soils are well suited to farming. They are well suited to open-land and woodland wildlife and are suited to wetland wildlife. Most areas of these soils are used for corn, soybeans, and wheat. Limitations for many nonfarm uses are severe.

Representative profile of Dupo silt loam, in a cultivated field, 66 feet east and 1,620 feet north of the center of sec. 12, T. 2 N., R. 9 W.:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) when dry; weak fine granular structure; friable; many roots; moderately alkaline; abrupt smooth boundary.

C1—10 to 16 inches; mixed yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4), and light brownish gray (10YR 6/2) silt loam; weak to moderate thick platy structure; friable; few iron stains; few worm casts; many roots; moderately alkaline; abrupt smooth boundary.

C2—16 to 23 inches; mixed light brownish gray (10YR 6/2), yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4), and very pale brown (10YR 7/3) stratified sand, loamy sand, and silt loam; very weak coarse granular structure parting to massive; friable; many roots; moderately alkaline; abrupt smooth boundary.

C3—23 to 29 inches; dark grayish brown (10YR 4/2) silt loam; weak medium and coarse granular structure; friable; few dark reddish brown (5YR 3/4) iron streaks and dark reddish brown (5YR 3/3) iron stains; many roots; moderately akaline; clear smooth boundary.

C4—29 to 36 inches; mixed dark grayish brown (10YR 4/2), dark brown (10YR 4/3), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/4) fine silt loam; weak to moderate medium granular structure parting to weak fine granular; friable; few dark brown (10YR 3/3) iron streaks; few worm casts; many roots; moderately alkaline; clear smooth boundary.

A11b—36 to 38 inches; black (10YR 2/1) silty clay to silty clay loam; moderate medium granular structure; friable; yellowish red (5YR 4/6) iron streaks; few roots; mildly alkaline; gradual smooth boundary.

A12b—38 to 60 inches; black (10YR 2/1) silty clay; moderate medium granular structure; firm; common fine distinct dark grayish brown (10YR 4/2) streaks; few roots; neutral.

The A horizon ranges from dark grayish brown to dark brown and is 6 to 11 inches thick. It is slightly acid to moderately alkaline. The A1b horizon ranges from very dark gray to black. It is medium acid to mildly alkaline.

Dupo soils are in positions on the landscape similar to those of Wakeland soils. Dupo soils have a black silty clay layer within a depth of 40 inches that Wakeland soils do not have.

180—Dupo silt loam. This nearly level soil is on the Mississippi River flood plain. Individual areas are relatively large and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of soils that are high in lime (calcareous) throughout the profile. Also included are some small areas of soils that have underlying material of silty clay loam instead of silty clay.

Seasonal wetness is a limitation. When this soil is protected from flooding, maintaining fertility and tilth is a major concern of management. This soil is well suited to most crops grown in the county. Management group IIw–3; woodland group 2w.

Ebbert Series

The Ebbert series consists of nearly level, poorly drained soils that formed in loess under grasses. These soils are on uplands.

In a representative profile the surface layer is very dark gray silt loam about 11 inches thick. The subsurface layer is gray silt loam about 5 inches thick. The subsoil is silty clay loam about 55 inches thick. It is mainly light gray with yellowish brown mottles in the upper part and light brownish gray with yellowish brown mottles in the lower part.

Organic-matter content is moderate. Permeability is slow, and available water capacity is very high.

Ebbert soils are well suited to farming if excess

water is removed. Drained areas are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife, are suited to woodland wildlife, and are well suited to wetland wildlife. These soils have no native woodland. Most areas are used for corn, soybeans, and wheat. Limitations for many nonfarm uses are severe.

Representative profile of Ebbert silt loam, in a cultivated field, 2,300 feet south and 1,470 feet east of the northwest corner of sec. 8, T. 1 S., R. 6 W.:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, light gray to gray (10YR 5/1) when dry; weak fine granular structure; friable; mildly alkaline; abrupt smooth boundary.

A1—7 to 11 inches; very dark gray (10YR 3/1) silt loam; weak thin platy structure; friable; mildly alkaline; abrupt smooth boundary.

A21—11 to 16 inches; gray (10YR 5/1) silt loam; weak thick platy structure parting to weak fine subangular blocky; friable; medium acid; clear smooth boundary.

B1tg—16 to 22 inches; light gray and gray (10YR 6/1 and 5/1) light silty clay loam; weak medium subangular blocky structure; friable; strongly acid; clear smooth boundary.

B21tg—22 to 31 inches; dark gray (10YR 4/1) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; strong fine and medium angular blocky structure; firm; continuous very dark gray (10YR 3/1) clay films on ped faces; very strongly acid; gradual smooth boundary.

B22tg—31 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine yellowish brown (10YR 5/4) mottles and few fine prominent yellowish brown (10YR 5/6) and very dark gray (10YR 3/1) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; very dark gray (10YR 3/1) clay films on most ped faces; very strongly acid; gradual smooth boundary.

B23t—38 to 47 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak medium angular blocky; firm; thin discontinuous dark gray (10YR 4/1) clay films on ped faces; medium acid; gradual smooth boundary.

B31—47 to 58 inches; mixed light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6, 5/8) light silty clay loam; weak coarse prismatic structure parting to weak coarse angular blocky; firm; thin discontinuous gray (10YR 5/1) clay films on ped faces; fine dark gray (10YR 4/1) veins and root channels; medium acid; gradual smooth boundary.

B32—58 to 71 inches; yellowish brown (10YR 5/6, 5/8) heavy silt loam; common fine prominent light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to massive; firm to friable; patchy gray (10YR 5/1) films in cracks and many root channels lined with dark gray (10YR 4/1); medium acid.

The Ap and A1 horizons range from dark gray to black and are 10 to 14 inches thick. The A2 horizon ranges from light gray to gray and is 4 to 9 inches thick. The B horizon has yellowish brown, strong brown, very dark gray, or yellowish red mottles. It is very strongly acid to slightly acid. The C horizon is at a depth of 40 to 72 inches. It is slightly acid to mildly alkaline.

Ebbert soils formed in the same kind of material in which Herrick, Sable, and Virden soils formed. Ebbert soils are poorly drained, whereas Herrick soils are somewhat poorly drained. Ebbert soils have a distinct grayish A2 horizon that Sable and Virden soils do not have.

48—Ebbert silt loam. This nearly level soil is in depressions in areas of the county that were former prairie. Individual areas are relatively small and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of soils that have more clay in the subsoil than the representative Ebbert soil. Also included are some small areas of soils that lack a distinct gray subsurface layer.

Slow permeability and seasonal wetness are limitations to the use of this soil. Maintaining fertility and tilth is a major concern of management. A system of surface drains improves drainage where outlets are available. If excess water is removed, this soil is well suited to most crops grown in the county. Management group IIw–2; woodland group 2w.

Fayette Series

The Fayette series consists of gently sloping to very steep, well drained soils that formed in thick silty material under a hardwood forest. These soils are mainly on upland bluffs along the Mississippi River valley.

In a representative profile the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The upper 22 inches of the subsoil is yellowish brown silty clay loam; the middle 9 inches is yellowish brown light silty clay loam that has some fine brownish gray streaks; and the lower 9 inches is light yellowish brown silt loam that has light brownish gray and yellowish brown mottles. The underlying material is mottled yellowish brown silt loam.

Organic-matter content is low. Permeability is moderate, and available water capacity is high.

Fayette soils are well suited to farming in gently sloping and sloping areas, are suited in strongly sloping areas, and are unsuited in moderately steep to very steep areas. They are well suited to open-land and woodland wildlife in gently sloping to strongly sloping areas and are suited in more strongly sloping areas, but they are unsuited to wetland wildlife. Gently sloping to strongly sloping areas are used for crops and nonfarm uses. Moderately steep to very steep areas generally are in woodland. Limitations for many nonfarm uses are slight to severe, depending on slopes.

Representative profile of Fayette silt loam, 2 to 4 percent slopes, 2,350 feet south and 250 feet west of the northeast corner of sec. 21, T. 2 N., R. 8 W.:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

A2—6 to 10 inches; brown (10YR 5/3) silt loam grading to yellowish brown (10YR 5/4) in lower part; weak thin platy structure grading downward to moderate fine subangular blocky; friable; strongly acid; clear smooth boundary.

B21t—10 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and fine subangular blocky structure; friable to firm; thin continuous yellowish brown (10YR 5/4) clay films on ped faces; strongly acid; clear smooth boundary.

B22t—15 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; moderately thick continuous dark brown (7.5YR 4/4) clay films on ped faces; strongly acid; clear smooth boundary.

B23t—22 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; moderately thick continuous dark yellowish brown (10YR 4/4) clay films on ped faces; strongly acid; clear smooth boundary.

B31t—32 to 41 inches; mixed yellowish brown (10YR 5/4 and 5/6) light silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm to friable; common iron and manganese concretions; few fine light brownish gray (10YR 6/2) streaks and thick continuous dark yellowish brown (10YR 4/4) clay films on ped faces; strongly acid; clear smooth boundary.

B32—41 to 50 inches; light yellowish brown (10YR 6/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles and few distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure parting to weak medium subangular blocky; friable; common fine iron and manganese concretions; yellowish brown (10YR 5/4) silt and clay films on ped faces; medium acid; clear smooth boundary.

C—50 to 70 inches; yellowish brown (10YR 5/4) silt loam; common fine and medium faint yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; slightly acid.

The Ap horizon is dark grayish brown to brown and is 6 to 8 inches thick. The A2 horizon is brown to yellowish brown and is 2 to 6 inches thick. The B horizon is brown to light yellowish brown. It is medium acid to strongly acid. The C horizon is at a depth of 40 to 60 inches. It is very strongly acid to neutral.

Fayette soils formed in the same kind of material in which Downs and Atterberry soils formed and are in similar positions on the landscape. Fayette soils are well drained, Downs soils are moderately well drained to well drained, and Atterberry soils are somewhat poorly drained. Fayette soils have a lighter colored surface layer than Downs soils.

280B—Fayette silt loam, 2 to 4 percent slopes. This gently sloping soil is mainly on ridgetops, generally adjacent to more strongly sloping Fayette soils. Individual areas are small to relatively large and are long and narrow. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of gently sloping, moderately well drained soils and areas of soils that have a surface layer less than 7 inches thick.

Runoff is medium, and the hazard of erosion is slight. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to most crops grown in the county. Management group IIe–1; woodland group 1o.

280B2—Fayette silt loam, 3 to 6 percent slopes, eroded. This sloping soil is mainly on the tops and sides of ridges in and around watercourses. Individual areas are generally long and irregular in shape. This soil has less than 7 inches of the original surface layer remaining. The surface layer is brown to yellowish brown, very friable silt loam. When cultivated, it is subject to severe erosion.

Included with this soil in mapping are small areas of soils that have more than 7 inches of the original surface layer remaining; some of these soils are similar to the representative Fayette soil. Also included are small areas of less well drained soils and some areas of strongly sloping Fayette soils.

Runoff is moderate, and the hazard of erosion is moderate where plant cover is maintained. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to most crops grown in the county. Management group IIe–2; woodland group 1o.

280C2—Fayette silt loam, 6 to 12 percent slopes, eroded. This strongly sloping soil is mainly in and around watercourses and on the sides of ridges. Individual areas are generally long and irregular in shape and are large. This soil has less than 7 inches of the original surface layer remaining. The surface layer is yellowish brown, very friable silt loam. The total thickness of the surface layer and subsoil is about 30 inches.

Included with this soil in mapping are small, mostly wooded areas of soils that have more than 7 inches of the original surface layer remaining and areas of sloping and moderately steep Fayette soils. Also included are some areas of soils that have gray and dark gray layers within a depth of 18 inches. These gray layers are commonly seepy during wet periods.

Runoff is moderate, and the hazard of erosion is moderate. Slopes and seepy areas are limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIIe–1; woodland group 1o.

280D2—Fayette silt loam, 12 to 18 percent slopes, eroded. This moderately steep soil is mainly along watercourses and on side slopes. Individual areas are relatively long and narrow in shape and are large. This soil has less than 7 inches of the original surface layer remaining. The surface layer is yellowish brown, friable silt loam. The combined thickness of the surface layer and subsoil is about 28 inches.

Included with this soil in mapping are small, mostly wooded areas of soils that have more than 7 inches of the original surface layer remaining. Also included are small, severely eroded areas where the plow layer consists of material from the upper part of the subsoil. Small areas of strongly sloping and steep Fayette soils are also included.

Runoff is moderate to rapid, and the hazard of erosion is moderately severe. Slope is a major limitation to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to crops grown in the county. Management group IVe–2; woodland group 1r.

280E—Fayette silt loam, 18 to 30 percent slopes. This soil is mainly along watercourses and in highly dissected areas within a mile of the Mississippi River flood plain. This soil is in woodland. Individual areas are relatively large to small and are irregular in shape. The surface layer is dark grayish brown to dark brown and is about 10 inches thick.

Included with this soil in mapping are some small areas of soils that have a subsoil of light silty clay loam less than 24 inches thick. Also included are some moderately steep and very steep areas.

Runoff is rapid, and the hazard of erosion is severe. Slope is a major limitation to the use of this soil. If this soil is cleared, controlling erosion and maintaining fertility and tilth are the main concerns of management. Because of slope, this soil is better suited to pasture or woodland than to most other uses. Management group VIe–1;; woodland group 1r.

280G—Fayette silt loam, 30 to 60 percent slopes. This very steep soil is mainly on side slopes. Individual areas are relatively large and are irregular in shape. This soil has more than 7 inches of the original surface layer remaining. The depth to the underlying material is about 24 inches.

Included with this soil in mapping are small areas

of cleared soils where erosion has reduced the thickness of the surface layer to less than 7 inches. Also included are areas of soils that have a subsoil of light silty clay loam that is less than 20 inches thick in some places, and some areas of soils that are not so steep as this soil.

The hazard of erosion is very severe. Slope is a major limitation to the use of this soil. If this soil is cleared, controlling erosion is the main concern of management. Because of slope and erosion, this soil is better suited to woodland than to most other uses. Most of the acreage is in woodland. Management group VIIe–1; woodland group 1r.

280B3—Fayette silty clay loam, 3 to 6 percent slopes, severely eroded. This sloping soil is mainly on side slopes in and around watercourses. Individual areas are generally long and irregular in shape and are small. This soil has less than 3 inches of the original surface layer remaining. The existing surface layer is a mixture of the original surface layer material and material from the upper part of the subsoil. In plowed areas it is yellowish brown and is less friable and has more clay in the upper 8 inches than in less eroded Fayette soils.

Included with this soil in mapping are small areas of less eroded Fayette silt loams and small areas of moderately well drained, severely eroded soils. Also included are small areas of soils where erosion has removed both the surface layer and subsoil and exposed the silty underlying material.

Runoff is moderate, and the hazard of erosion is moderate to severe. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIIe–2; woodland group 1o.

280C3—Fayette silty clay loam, 6 to 12 percent slopes, severely eroded. This strongly sloping soil is mainly in and around watercourses and on the sides of ridges. Individual areas are relatively small and are irregular in shape. This soil has less than 3 inches of the original surface layer remaining. The existing surface layer is a mixture of the original surface layer material and material from the upper part of the subsoil. In plowed areas the surface layer is yellowish brown and is less friable and has more clay in the upper 8 inches than in less eroded Fayette soils.

Included with this soil in mapping are small areas of less eroded Fayette silt loam and areas of soils where erosion has removed all of the surface and subsurface layers and exposed the gray to yellowish brown, friable silt loam underlying material. Also included are areas of soils that are less well drained than the representative Fayette soil. Gray layers are common in middle slope positions.

Runoff is moderate, and the hazard of erosion is moderately severe. Slope is a major limitation to the use of this soil. Seepy spots near areas of gray spots are common during wet periods. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to crops grown in the county. Management group IVe–1; woodland group 1o.

280D3—Fayette silty clay loam, 12 to 18 percent slopes, severely eroded. This moderately steep soil is mainly on side slopes in and around watercourses. Individual areas are mainly relatively long and narrow and are small. This soil has less than 3 inches of the original surface layer remaining. The existing surface layer is a mixture of the original surface layer material and material from the upper part of the subsoil. In plowed areas the surface layer is yellowish brown and is less friable and has more clay in the upper 8 inches than in less eroded Fayette soils.

Included with this soil in mapping are small areas of less eroded Fayette silt loams and small areas where erosion has removed both the surface layer and subsoil. Also included are areas of soils, generally in upper slope positions, that have gray or dark gray silt loam on the surface. These gray layers are seepy during wet periods. Some strongly sloping and steep areas are also included.

Runoff is moderately rapid, and the hazard of erosion is moderately severe. Slope and seepy areas are major limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Because of slope and the hazard of erosion, this soil is better suited to pasture and woodland than to most other uses. Management group VIe–1; woodland group 1r.

280E3—Fayette silty clay loam, 18 to 30 percent slopes, severely eroded. This steep soil is mainly along watercourses and within the highly dissected areas near the Mississippi River flood plain. This soil has been cleared and cultivated. Individual areas are relatively large to small and are irregular in shape. The original surface layer is less than 3 inches thick. The existing surface layer is a mixture of the original surface layer material and material from the upper part of the subsoil. In plowed areas the surface layer is yellowish brown and is less friable and has more clay in the upper 8 inches than in less eroded Fayette soils.

Included with this soil in mapping are small areas of soils where the depth to the underlying material is less than 18 inches. Also included are areas where erosion has removed the surface layer and subsoil and exposed the silty underlying material. These exposed areas are high in lime (calcareous) in some places.

Runoff is rapid, and the hazard of erosion is severe. Slope is a major limitation to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. Because of slope, this soil is better suited to pasture or woodland than to most other uses. Management group VIe–1; woodland group 1r.

U280B—Fayette-Urban land complex, 1 to 7 percent slopes. This complex consists of silty, nearly level to sloping Fayette soils that have been partly disturbed by urban development. Most areas are on broad ridges within the urbanized area in the county. Vegetation is a mixture of lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Fayette soils, 20 percent Urban land, and 30 percent areas that have been modified by covering Fayette soils with fill or by grading. A Fayette soil in an undisturbed area of this complex has the profile described as representative of the series. Most of the Urban land is covered by buildings and pavement. In modified areas, the fill material is both silty and clayey and generally comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of

moderately well drained soils and areas of the strongly sloping Fayette-Urban land complex.

These soils have slight limitations for many urban uses. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

U280C—Fayette-Urban land complex, 7 to 15 percent slopes. This complex consists of silty, strongly sloping Fayette soils that have been partly disturbed by urban development. Most areas are on side slopes in and around the watercourses within the urbanized area in the county. Vegetation is a mixture of lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Fayette soils, 20 percent Urban land, and 30 percent areas that have been modified by covering Fayette soils with fill or by grading. Most of the Urban land is covered by buildings and pavement. In modified areas, the fill material is both silty and clayey and generally comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of the nearly level to sloping Fayette-Urban land complex and the moderately steep to steep Fayette-Urban land complex.

Slope is a moderate limitation for many urban uses. During construction, these soils erode easily and produce large amounts of sediment. The establishment of lawns, ornamental shrubs, and other vegetation requires extra care to prevent erosion. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

U280E—Fayette-Urban land complex, 15 to 25 percent slopes. This complex consists of silty, moderately steep to steep Fayette soils that have been partly disturbed by urban development. Most areas are on side slopes adjacent to bottom lands within urbanized areas of the county. Vegetation is a mixture of lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Fayette soils, 20 percent Urban land, and 30 percent areas that have been modified by covering Fayette soils with fill or by grading. Most of the Urban land is covered by buildings and pavements. In modified areas, the fill material is both silty and clayey and generally comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of the strongly sloping Fayette-Urban land complex and the steep Sylvan-Bold-Urban land complex.

Slope is a severe limitation for many urban uses. During construction, this soil erodes easily. Because the hazard of erosion is severe, reestablishment of vegetation requires special techniques. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

Gorham Series

The Gorham series consists of nearly level, poorly drained soils that formed in silty alluvial sediment less than 40 inches thick over stratified sand and silt. These soils formed under grasses and trees that thrive in wet conditions. They are mainly in sloughs and on ridges on the Mississippi River flood plain.

In a representative profile the surface layer is very dark gray silty clay loam about 14 inches thick. The upper part of the subsoil is mainly mottled, dark gray to gray silty clay loam, and the lower part is gray very fine sandy loam that has dark brown and olive brown mottles. The underlying material is gray and brown to dark brown sand.

Organic-matter content is high. Permeability is moderately slow, and available water capacity is high.

Gorham soils are well suited to farming. Drained areas are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are suited to open-land wildlife and are well suited to woodland and wetland wildlife. Most areas of these soils are used for wheat, but urbanization is removing some acreage from farming. Limitations for many nonfarm uses are severe.

Representative profile of Gorham silty clay loam (0 to 2 percent slopes) in a cultivated field, State Plane Coordinates, 695,100 feet north and 494,500 feet east (Illinois west zone), (unsurveyed) T. 1 N., R. 10 W.:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam; moderate to strong fine crumb structure; firm to friable; strongly acid; abrupt smooth boundary.

A1—7 to 14 inches; very dark gray (10YR 3/1) silty clay loam; few fine distinct dark yellowish brown (10YR 4/4) mottles and common medium distinct grayish brown (2.5Y 5/2) mottles; weak medium angular blocky structure in the upper part and weak fine prismatic structure parting to moderate fine subangular blocky in the lower part; firm; sightly acid; gradual smooth boundary.

B1—14 to 22 inches; dark gray to gray (10YR 4/1 and 5/1) silty clay loam; few fine distinct brown to dark brown (7.5Y 4/4) mottles; continuous fairly thick gray to very dark gray (10YR 3/1 and 4/1) clay films on ped faces; weak medium prismatic structure parting to weak medium angular blocky; friable; neutral; clear smooth boundary.

B2—22 to 32 inches; mixed gray (10YR 5/1) and light olive brown (2.5Y 5/6) silty clay loam; weak medium prismatic structure parting to medium and coarse subangular blocky; firm; nearly continuous dark gray (10YR 4/1) clay films on ped faces; neutral; abrupt smooth boundary.

IIB3—32 to 42 inches; gray (5Y 5/1) very fine sandy loam; common medium distinct brown and dark brown (7.5YR 4/4) mottles and common medium faint olive brown (2.5Y 4/4) mottles; weak medium prismatic structure; friable; dark gray (10YR 4/1) pore fillings and root channels; mildly alkaline; abrupt smooth boundary.

IIC1—42 to 63 inches; mixed gray (10YR 5/1) and brown to dark brown (7.5YR 4/4) sand; single grained; friable to loose; mildly alkaline.

The A horizon ranges from very dark gray to black and is 12 to 16 inches thick. The B horizon is slightly acid to mildly alkaline. The C horizon is at a depth of 35 to 50 inches. It is slightly acid to mildly alkaline.

Gorham soils formed in the same kind of material in which Riley and Beaucoup soils formed. Gorham soils have thicker A and B horizons (more than 30 inches) than Riley soils. They have sandy underlying material, whereas Beaucoup soils have silty underlying material.

162—Gorham silty clay loam. This nearly level soil is on the Mississippi River flood plain. Individual areas are long and narrow and are relatively small. Slopes are 0 to 2 percent.

Included with this soil in mapping are some small areas of Beaucoup soils that are deep to sand and some

small areas of Riley soils that are shallow to sand. Also included are some small areas of soils that have silty underlying material.

Providing drainage and controlling flooding are the main concerns of management. If drained, this soil is well suited to most crops grown in the county. Management group IIw–3; woodland group 2o.

Haymond Series

The Haymond series consists of nearly level, well drained soils that formed in water-deposited silty material under a hardwood forest. These soils are mainly on narrow bottom lands below forested uplands along the bluffs adjacent to the Mississippi River valley.

In a representative profile the surface layer is brown silt loam about 8 inches thick. The underlying material is brown, stratified silt and silt loam.

Organic-matter content is low. Permeability is moderate, and available water capacity is very high. Runoff is very slow.

Haymond soils are well suited to farming. Because of the hazard of flooding, they are fairly well suited to open-land wildlife and are well suited to woodland wildlife, because they are well drained, however, they are poorly suited to wetland wildlife. Most areas of these soils are used for corn and soybeans, but some areas are very narrow and are in woodland. Limitations for many nonfarm uses are severe because of flooding.

Representative profile of Haymond silt loam, in a cultivated field, 25 feet east and 43 feet south of the northeast corner of sec. 30, T. 1 N., R. 9 W.:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

C1—8 to 24 inches; brown (10YR 4/3) stratified silt loam and silt; weak coarse platy structure parting to weak fine granular; friable; brown (10YR 5/3) silt strata; neutral; clear smooth boundary.

C2—24 to 60 inches; brown (10YR 5/3) silt loam; few fine faint brown (10YR 4/3) mottles; weak coarse granular structure parting to massive; friable; neutral; clear smooth boundary.

The Ap horizon ranges from brown to very dark gray and is 5 to 10 inches thick. The C horizon ranges from dark brown to yellowish brown. It is medium acid to neutral.

Haymond soils formed in the same kind of material in which Wakeland soils formed and are in similar positions on the landscape. Haymond soils are well drained, whereas Wakeland soils are somewhat poorly drained.

331—Haymond silt loam. This nearly level soil is on bottom lands along the tributaries of the Mississippi River. Individual areas are relatively narrow, are long, and are irregular in shape. Slopes are 0 to 2 percent.

Included with this soil in mapping are some small areas of somewhat poorly drained Wakeland soils. Also included are small areas of soils that are strongly acid and moderately alkaline.

Controlling flooding and maintaining fertility and tilth are the main concerns of management. Because of flooding, this soil is better suited to corn and soybeans than to other crops. Management group I–2; woodland group 1o.

Herrick Series

The Herrick series consists of nearly level, somewhat poorly drained soils that formed in silty deposits (loess) under grasses. These soils are mainly on side slopes east of Silver Creek.

In a representative profile the surface layer is very dark brown and very dark gray silt loam about 15 inches thick. The upper 7 inches of the subsoil is mainly yellowish brown silty clay loam that has yellowish brown to reddish yellow mottles; the middle 10 inches is mottled, very pale brown and light brownish gray silty clay loam; and the lower 24 inches is mottled, light gray light silty clay loam. The underlying material is mottled, light gray silt loam.

Organic-matter content is moderate. Permeability is moderately slow, and available water capacity is high.

Herrick soils are well suited to farming if excess water is removed. They are well suited to open-land and woodland wildlife but are unsuited to wetland wildlife. These soils have no natural woodland. Most areas are used for corn, wheat, and soybeans. Limitations for many non-farm uses are severe.

Representative profile of Herrick silt loam, 1,000 feet east and 1,420 feet north of the southwest corner of sec. 29, T. 1 N., R. 6 W.:

Ap—0 to 5 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; friable; abundant roots; strongly acid; clear smooth boundary.

A1—5 to 11 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; friable; abundant roots; very strongly acid; clear smooth boundary.

A3—11 to 15 inches; very dark gray (10YR 3/1) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few soft fine iron concretions; abundant roots; very dark grayish brown (10YR 3/2) worm casts; strongly acid; gradual smooth boundary.

B21t—15 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct brownish yellow to yellowish brown (10YR 5/6 and 6/8) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable to firm; very dark gray (10YR 3/1) clay coating on ped faces; common roots; few fine iron concretions; dark yellowish brown (10YR 3/4) worm casts; strong brown (7.5YR 5/8) and yellowish red (5YR 4/8 and 5/8) iron stains; strongly acid; abrupt wavy boundary.

B22t—20 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; common medium prominent yellowish red to reddish yellow (5YR 4/8 and 6/8) mottles and few fine distinct reddish yellow to strong brown (7.5YR 5/8 and 6/8) and light gray (10YR 7/2) mottles; strong coarse subangular blocky structure; firm; few roots; appears to be an accumulation of soft iron concretions; dark yellowish brown (10YR 3/4) clay coatings on ped faces; medium acid; clear smooth boundary.

B23t—22 to 32 inches; very pale brown (10YR 7/3) and light brownish gray (10YR 6/2) silty clay loam; moderate coarse and fine subangular blocky structure; friable to firm; few yellowish brown and brown (10YR 5/6 and 5/3) roots; many soft iron and manganese concretions; clay coatings mainly on vertical ped faces; medium acid; clear smooth boundary.

B3—32 to 56 inches; light gray (10YR 7/2) light silty clay loam; common medium prominent reddish yellow to strong brown (7.5YR 5/8 and 6/8) mottles and few fine faint yellow to brownish yellow (10YR 6/8 and 7/8) mottles; massive; friable; grayish brown (10YR 5/2) clay coatings on root channels; many very dark grayish brown (10YR 3/2) iron concretions; some dark reddish brown (2.5YR 3/4), reddish yellow (7.5YR 6/8), and strong brown (7.5YR

5/8) horizontal layers (appearing to be iron stains) ½ to 1 inch thick and 2 to 5 inches apart; medium acid; gradual smooth boundary.

C—56 to 60 inches; mottled light gray (10YR 7/2) silt loam; massive; friable; discontinuous layers of manganese oxides; medium acid.

The A horizon is very dark grayish brown, very dark gray, and very dark brown and is 11 to 15 inches thick. A thin, lighter colored A2 horizon is in some pedons. The B horizon ranges from very dark yellowish brown to light gray and has brownish yellow to yellowish red mottles. The B horizon is strongly acid to neutral. The C horizon is at a depth of 36 to 60 inches. It is medium acid to mildly alkaline.

Herrick soils formed in the same kind of material in which Ebbert, Virden, Piasa, and Darmstadt soils formed and are in similar positions on the landscape. Herrick soils are somewhat poorly drained, whereas Ebbert, Virden, and Piasa soils are poorly drained. Herrick soils lack the high sodium content that Piasa and Darmstadt soils have. They also lack the distinct light colored A2 horizon that Ebbert, Piasa, and Darmstadt soils have.

46—Herrick silt loam. This nearly level soil is on uplands. Slopes are 0 to 2 percent. Individual areas are small and are irregular in shape where they are near Piasa soils, and they are moderately large and are uniform in shape where they are near Virden and Ebbert soils.

Included with this soil in mapping are some small areas of soils that are similar to this Herrick soil but are grayish in the upper part of the subsoil and browner in the surface layer and some areas that have a light colored subsurface layer. Also included in and around the Kaskaskia River are areas of soils that have clayey water-deposited sediment within a depth of 60 inches.

Moderately slow permeability and seasonal wetness are major limitations to the use of this soil. Maintaining fertility and tilth is the main concern of management. A system of subsurface tile drains improves drainage where outlets are available. This soil is suited to most crops grown in the county. Management group IIw–2; woodland group 2o.

Hickory Series

The Hickory series consists of steep, well drained soils that formed in glacial till under a hardwood forest. They are mainly on uplands adjacent to large watercourses.

In a representative profile the surface layer is brown loam about 5 inches thick. The subsoil is brown and yellowish brown clay loam about 54 inches thick. It has dark brown films on structure faces. The underlying material is yellowish brown to strong brown clay loam and loam.

Organic-matter content is low. Permeability is moderate, and available water capacity is high.

Hickory soils are generally not suited to farming. They are suited to open-land and woodland wildlife but are unsuited to wetland wildlife. Most areas of these soils have been cleared and are used for crops. Many areas are idle and have become naturally reforested. Limitations for many nonfarm uses are severe.

Representative profile of Hickory loam, 18 to 30 percent slopes, eroded, in a cultivated field, 2,500 feet north and 725 feet west of the southeast corner of sec. 8, T. 1 S., R. 9 W.:

Ap—0 to 5 inches; brown (10YR 4/3) loam; moderate medium angular blocky structure; firm; slightly acid; abrupt smooth boundary.

B21t—5 to 16 inches; brown (7.5YR 5/4) clay loam; moderate fine prismatic structure parting to moderate to strong fine angular blocky; firm; continuous dark brown (7.5YR 4/4) clay films on ped faces; few fine iron and manganese concretions; medium acid; clear smooth boundary.

B22t—16 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate fine prismatic structure parting to strong fine and very fine angular blocky; firm; continuous dark brown (7.5YR 4/4) clay films on ped faces, very pale brown (10YR 7/4) silt coats on ped faces which disappear on wetting; strongly acid; clear smooth boundary.

B23t—27 to 43 inches; yellowish brown (10YR 5/6) clay loam; moderate medium prismatic structure parting to strong fine subangular blocky; firm; continuous dark brown (7.5YR 4/4) clay films and iron and manganese splotches on ped faces; strongly acid; gradual smooth boundary.

B3—43 to 59 inches; brown (7.5YR 5/4) light clay loam; moderate medium prismatic structure; firm; dark brown (7.5YR 4/4) clay films on vertical ped faces; prominent iron and manganese splotches; yellowish red (5YR 5/8) streaks; slightly acid; clear smooth boundary.

C1—59 to 64 inches; yellowish brown (10YR 5/8) clay loam; moderate coarse prismatic structure; firm; discontinuous brown (7.5YR 5/4) clay films on vertical ped faces; moderately alkaline; clear smooth boundary.

C2—64 to 67 inches; strong brown (7.5YR 5/6) loam; massive; firm; slight effervescence; moderately alkaline.

The Ap horizon ranges from brown to very dark gray and is 3 to 10 inches thick. It is loam or clay loam. The B horizon ranges from yellowish brown to brown. It is medium acid to strongly acid in the upper part and slightly acid in the lower part. The C horizon is at a depth of 45 to 60 inches. It is neutral to moderately alkaline.

Hickory soils are in positions on the landscape similar to those of Fayette soils. Hickory soils formed in glacial material, whereas the well drained Fayette soils formed in silty material (loess).

8F2—Hickory loam, 18 to 30 percent slopes, eroded. This steep soil is mainly in areas between soils on bottom land and less sloping silty soils on uplands. Individual areas are relatively narrow.

Included with this soil in mapping are some small areas of soils that have not been cleared of trees and have a much thicker surface layer than this Hickory soil. Also included are small areas of soils that have silty material to a depth of 24 inches.

Runoff is very rapid, and the hazard of erosion is severe. Controlling erosion and maintaining tilth and fertility are the main concerns of management. Because of slope and the hazard of erosion, this soil is better suited to pasture and woodland than to most other uses. Management group VIe–1; woodland group 1r.

Hurst Series

The Hurst series consists of nearly level to strongly sloping, somewhat poorly drained soils that formed in silty and fine textured alluvial sediment under a hardwood forest. These soils are mainly on low terraces adjacent to the Kaskaskia River flood plain.

In a representative profile the surface layer is grayish brown silt loam about 7 inches thick. The subsurface layer, about 5 inches thick, is mixed grayish brown and light brownish gray silt loam in the upper part and light brownish gray silt loam in the lower part. The up-

per part of the subsoil is grayish brown silty clay loam that has yellowish brown mottles; next is mixed pale brown, brown, and yellowish brown silty clay; below this is grayish brown, dark yellowish brown, and yellowish brown silty clay; and the lower part is mixed light brownish gray and strong brown silty clay loam.

Organic-matter content is low. Permeability is very slow, and available water capacity is moderate. Runoff is slow to moderate.

Hurst soils are suited to farming if they are fertilized. Nearly level areas are well suited to open-land wildlife and are suited to woodland and wetland wildlife. Gently sloping areas are suited to open-land and woodland wildlife but are unsuited to wetland wildlife. These soils are suited to woodland, but most areas have been cleared of trees. Excess water in nearly level areas and erosion in sloping areas are limitations. Limitations for many nonfarm uses are severe.

Representative profile of Hurst silt loam, 0 to 2 percent slopes, in a cultivated field, 560 feet east and 110 feet north of the center of sec. 12, T. 1 S., R. 7 W.:

Ap—0 to 7 inches; grayish brown (2.5Y 5/2) silt loam; weak fine and very fine granular structure; friable; strongly acid; abrupt smooth boundary.

A21—7 to 10 inches; mixed grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium platy structure parting to weak fine and very fine granular; friable; medium acid; abrupt smooth boundary.

A22—10 to 12 inches; light brownish gray (10YR 6/2) silt loam; common fine faint pale brown (10YR 6/3) mottles and few medium faint brown (10YR 5/3) mottles; weak fine granular structure; friable, white (10YR 8/1) silt grains on ped faces when dry; very strongly acid; abrupt smooth boundary.

B21t—12 to 21 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

B22t—21 to 29 inches; mixed pale brown (10YR 6/3), brown (10YR 5/3), and yellowish brown (10YR 5/6) silty clay; weak medium and coarse subangular blocky structure; firm; common iron concretions; discontinuous light brownish gray (10YR 6/2) silt grains on vertical ped faces; very strongly acid; clear smooth boundary.

B23t—29 to 41 inches; mixed grayish brown (10YR 5/2), dark yellowish brown (10YR 4/4), and yellowish brown (10YR 5/6) silty clay; moderate medium prismatic structure parting to weak coarse subangular blocky; firm; numerous iron concretions; few thick grayish brown (2.5Y 5/2) silt grains and thin nearly continuous brown (10YR 4/3) clay films on vertical ped faces; very strongly acid, abrupt smooth boundary.

B24t—41 to 45 inches; mixed light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) silty clay loam; moderate and strong medium prismatic structure; firm; thick black (10YR 2/1) coatings on vertical ped faces; black (10YR 2/1) root and pore fillings; slightly acid; abrupt smooth boundary.

B25t—45 to 60 inches; mixed light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) silty clay loam; moderate coarse prismatic structure; friable; patchy grayish brown (10YR 5/2) clay films on ped faces; black (10YR 2/1) pore and root fillings; mildly alkaline.

The Ap horizon ranges from gray to dark grayish brown. It is silt loam or silty clay loam. The A2 horizon ranges from light gray to brown. The B horizon ranges from light brownish gray to yellowish brown. It is silty clay loam in the upper part, silty clay to clay in the middle part, and silty clay loam in the lower part. It is strongly acid and very strongly acid in the upper part and very strongly acid to slightly acid in the lower part. The C horizon is at a depth of 40 to 60 inches or more. It ranges from light brownish gray to grayish brown and from silty clay to heavy silty clay loam. It is medium acid to mildly alkaline. A sandy substratum phase of this series has loamy sand, sand, and sandy loam layers in the C horizon at a depth of 40 to 60 inches. The sandy substratum phase ranges from grayish brown to light brownish gray and yellowish brown.

Hurst soils formed in the same kind of material in which Okaw soils formed and are in similar positions on the landscape. Hurst soils are somewhat poorly drained, Okaw soils are poorly drained.

338A—Hurst silt loam, 0 to 2 percent slopes. This nearly level soil is on terraces along the Kaskaskia River. The areas are relatively small and are irregular in shape. This soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas of soils that are underlain by sandy loam within a depth of 60 inches. Also included are small areas of poorly drained Okaw soils, areas of gently sloping Hurst soils, and some areas of soils that are similar to this Hurst soil but the upper part of the subsoil has less clay and the surface layer is silt loam more than 12 inches thick.

Slow permeability and seasonal wetness are major limitations to the use of this soil. Maintaining fertility is a major concern of management. A system of surface drains removes excess water where outlets are available. This soil is suited to most crops grown in the county. Management group IIIw–3; woodland group 3o.

338B2—Hurst silt loam, 2 to 5 percent slopes, eroded. This gently sloping soil is in areas between the nearly level Hurst and Okaw soils and the adjacent soils on bottom lands and is in and around gently sloping watercourses that extend into areas of Hurst and Okaw soils. It is also on terraces and in outwash areas along the Kaskaskia river. Individual areas are small and are long and narrow. This soil has less than 7 inches of the original surface layer remaining. This has been mixed with material from the upper part of the subsoil in plowed areas, and here the surface layer is brown to yellowish brown and has more clay than is in the surface layer of uneroded Hurst soils.

Included with this soil in mapping are some small areas of soils that have less than 3 inches of the original surface layer remaining because of severe erosion. Also included are wooded areas of soils that have a surface layer more than 7 inches thick. Small areas of sloping Hurst soils are also included.

Very slow permeability and seepy spots are limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to the grain crops grown in the county. Management group IIIe–3; woodland group 3o.

S338B—Hurst silt loam, 1 to 4 percent slopes, sandy substratum. This nearly level to gently sloping soil is generally in slightly elevated areas within areas of nearly level Hurst and Okaw soils. It is also on terraces in the Kaskaskia River valley. Individual areas are small and are uniform in shape. This soil has a profile similar to the one described as representative of the series, but it has a sandy substratum at a depth of 40 to 60 inches. Because this substratum has moder-

ately rapid permeability, gray mottles are less common in the lower part of the subsoil.

Included with this soil in mapping are some small areas of Hurst silt loam, 0 to 2 percent slopes. Also included are small areas of soils that have a thin layer of sandy sediment on the surface.

Wetness and very slow permeability in the clayey material above the sandy substratum are limitations to the use of this soil. Controlling erosion and maintaining tilth and fertility are the main concerns of management. This soil is suited to crops commonly grown in the county. Management group IIIe–3; woodland group 3o.

338C2—Hurst silty clay loam, 5 to 10 percent slopes, eroded. This sloping to strongly sloping soil is in areas between other soils on terraces and soils on bottom lands within the Kaskaskia River valley. It is also in and around watercourses that extend into the terraces. Individual areas are relatively small in size and long and narrow in shape. This soil has less than 7 inches of the original surface layer remaining. This has been mixed with the upper part of the subsoil in plowed areas, and here the surface layer is brown to yellowish brown and has more clay than the surface layer in uneroded Hurst soils.

Included with this soil in mapping are some small areas of Hurst soils that have less than 3 inches of the original surface layer remaining and small, generally wooded, areas that have more than 7 inches of the original surface layer remaining. Some small areas of gently sloping soils and moderately well drained soils are included in places.

Very slow permeability, slope, and seepy spots are limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is fairly well suited to grain crops in the county. Management group IVe–2; woodland group 3o.

Iva Series

The Iva series consists of nearly level to gently sloping, somewhat poorly drained soils that formed in thick silty material under a hardwood forest. These soils are on uplands in many parts of the county.

In a representative profile the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is light brownish gray silt loam about 5 inches thick. The upper 4 inches of the subsoil is grayish brown light silty clay loam; the next 4 inches is pale brown silty clay loam that has brownish yellow and yellowish brown mottles; the next 5 inches is light brownish gray heavy silty clay loam that has yellowish brown mottles; the next 5 inches is pale brown silty clay loam that has yellowish red and yellowish brown mottles; the next 8 inches is light brownish gray light silty clay loam that has yellowish red and strong brown mottles; and the lower 4 inches is light brownish gray silt loam that has dark red and yellowish red mottles. The underlying material is light olive brown silt loam that has yellowish brown mottles.

Organic-matter content is low. Permeability is slow, and available water capacity is high.

Iva soils are suited to farming. They are well suited to open-land and woodland wildlife. They are fairly well suited to wetland wildlife in nearly level areas and are unsuited in gently sloping areas. Iva soils are used for both farm and nonfarm uses. Limitations for many nonfarm uses are moderate to severe because of permeability and the seasonal water table.

Representative profile of Iva silt loam, 0 to 2 percent slopes, 174 feet south and 159 feet east of the northwest corner of sec. 30, R. 8 W., T. 2 S.:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine crumb structure; friable; medium acid; abrupt smooth boundary.

A2—9 to 14 inches; light brownish gray (10YR 6/2) silt loam; weak medium platy structure parting to weak fine crumb; friable; few small hard iron concretions; light gray (10YR 7/2) silt grains on ped faces; strongly acid; abrupt smooth boundary.

B1—14 to 18 inches; grayish brown (10YR 5/2) light silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few small iron concretions; nearly continuous light gray (10YR 7/1) silt grains on vertical ped faces, thin discontinuous light brownish gray (10YR 6/2) clay films on ped faces; strongly acid; clear smooth boundary.

B21t—18 to 22 inches; pale brown (10YR 6/3) silty clay loam; few fine faint brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate to strong medium angular blocky; light brownish gray (10YR 6/2) clay films on ped faces; strongly acid; clear smooth boundary.

B22t—22 to 27 inches; light brownish gray (10YR 6/2) heavy silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few small iron concretions; nearly continuous brown (10YR 5/3) clay films on ped faces; strongly acid; clear smooth boundary.

B23t—27 to 32 inches; pale brown (10YR 6/3) silty clay loam; few medium prominent yellowish red (5YR 5/8) mottles and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; few small iron concretions; thin discontinuous light brownish gray (10YR 6/2) clay films on ped faces; strongly acid; clear smooth boundary.

B31—32 to 40 inches; light brownish gray (2.5Y 6/2) light silty clay loam; few coarse prominent yellowish red (5YR 5/8) mottles and common medium prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; few small iron concretions; patchy light gray (10YR 7/1) silt grains and patchy light brownish gray (10YR 6/2) clay films on ped faces; strongly acid; clear smooth boundary.

B32—40 to 44 inches; light brownish gray (2.5Y 6/2) silt loam; common coarse prismatic dark red (2.5YR 3/6) mottles and few medium prominent yellowish red (5YR 4/8) mottles; weak coarse prismatic structure; firm to friable; red mottles associated with patchy iron; patchy light brownish gray (10YR 6/2) clay films on ped faces; strongly acid; gradual smooth boundary.

C—44 to 60 inches; light olive brown (2.5Y 5/3) silt loam; many coarse prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; bands of iron segregation increasing to 2 to 3 inches in thickness toward lower part of this horizon; medium acid.

The Ap horizon ranges from light brownish gray to dark grayish brown and is 6 to 9 inches thick. The A2 horizon ranges from light gray to yellowish brown and is 3 to 11 inches thick. The B horizon ranges from light brownish gray to strong brown and has gray to dark red mottles. The gray mottles increase in abundance as depth increases. The B horizon is mostly strongly acid to medium acid, but it is neutral in the lower part in some places.

Iva soils formed in the same kind of material in which

Weir and Alford soils formed and are in similar positions on the landscape. Iva soils are somewhat poorly drained, whereas Weir soils are poorly drained and Alford soils are well drained.

454A—Iva silt loam, 0 to 2 percent slopes. This nearly level soil is mainly on broad ridges. Individual areas are relatively large and are uniform in shape. This soil has the profile described as representative of the series.

Included with this soil in mapping are some small areas of nearly level, poorly drained Weir soils and nearly level, moderately well drained soils. In a few places small areas of gently sloping Iva or Alford soils are included. Also included, near the Kaskaskia River, are areas of soils that have clayey underlying material.

Runoff is slow, and the hazard of erosion is slight. Seasonal wetness and slow permeability are limitations to the use of this soil. Removing excess water in some years and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIw–2; woodland group 2o.

454B—Iva silt loam, 2 to 4 percent slopes. This gently sloping soil is mainly in areas associated with the upper part of watercourses. Individual areas are relatively small and are irregular in shape. This soil has a profile similar to the one described as representative of the series, but the surface layer is browner.

Included with this soil in mapping are small areas of soils that have a light brownish gray surface layer in which less than 7 inches of the original surface layer remains; areas of soils that have better drainage than this Iva soil and are brown; and some areas of soils near the Kaskaskia River, that have clayey underlying material.

Runoff is slow to medium, and the hazard of erosion is slight. Seasonal wetness and slow permeability are limitations to the use of this soil. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIe–1; woodland group 2o.

454B2—Iva silt loam, 2 to 4 percent slopes, eroded. This gently sloping soil is on uplands associated with watercourses. Individual areas are relatively small and are irregular in shape. This soil has less than 7 inches of the original surface layer remaining. This has been mixed with the upper part of the subsoil in plowed areas, and here the surface layer is brownish gray and has more clay than is in the surface layer of uneroded Iva soils.

Included with this soil in mapping are small areas of less eroded Iva soils and small areas of moderately well drained soils. A few small areas of moderately sloping soils are also included.

Runoff is medium. Because of overland flow into the watercourses, the hazard of erosion is slight to medium. Because of past erosion, thick surface crusts have formed, which reduce water intake rate and seedling emergence. Seasonal wetness and slow permeability are limitations to the use of this soil. Controlling erosion, minimizing crust formation, and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIe–2; woodland group 2o.

Karnak Series

The Karnak series consists of nearly level to depressional, poorly drained soils that formed in silty clay alluvial sediment more than 60 inches thick. These soils formed under a hardwood forest. They are on bottom lands in the Kaskaskia River flood plain.

In a representative profile the surface layer is very dark gray silty clay about 5 inches thick. The subsoil, about 44 inches thick, is dark gray silty clay in the upper part and gray silty clay in the lower part. The upper part of the subsoil has dark brown mottles. The underlying material is gray silty clay.

Organic-matter content is moderate. Permeability is slow to very slow, and available water capacity is moderate. Runoff is very slow to ponded.

Karnak soils are suited to farming if they are drained and protected from flooding and ponding. Drained areas are well suited to open-land wildlife, are suited to woodland wildlife, and are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land and woodland wildlife and are suited to wetland wildlife. These soils are suited to woodland, and most areas are in woodland. Limitations for most nonfarm uses are severe.

Representative profile of Karnak silty clay, in a cultivated area, 2,500 feet east and 1,200 feet north of the southwest corner of sec. 33, T. 1 S., R. 6 W.:

Ap—0 to 5 inches; very dark gray (10YR 3/1) silty clay; few fine faint dark brown (7.5YR 4/4) mottles; weak medium angular blocky structure; firm; slightly acid; abrupt smooth boundary.

B1g—5 to 12 inches; dark gray (10YR 4/1) silty clay; few medium distinct dark brown (7.5YR 4/4) mottles; weak medium angular blocky structure parting to moderate fine angular blocky; firm; medium acid; clear smooth boundary.

B21g—12 to 27 inches; gray (5Y 5/1) silty clay; few fine faint yellowish brown (10YR 5/4) mottles; weak fine prismatic structure parting to moderate fine angular blocky; firm; continuous gray (5YR 5/1) clay films on ped faces; medium acid; gradual smooth boundary.

B22g—27 to 40 inches; gray (5Y 5/1) silty clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate to strong medium angular blocky; firm; grayish brown (2.5YR 5/2) nearly continuous clay films on ped faces; medium acid; gradual smooth boundary.

B3g—40 to 49 inches; gray (5Y 5/1) silty clay; many medium prominent strong brown (7.5YR 5/6) mottles; weak to moderate medium prismatic structure; firm; slightly acid; clear smooth boundary.

Cg—49 to 61 inches; gray (5Y 6/1) light silty clay; few fine prominent yellowish brown (10YR 5/4) mottles; moderate to strong fine and medium angular blocky structure; firm; neutral.

The Ap horizon ranges from dark gray to black. The B horizon is dark gray and gray. It is medium acid to neutral. Depth to the C horizon ranges from 48 to 60 inches. The C horizon ranges from silty clay to heavy silty clay loam and, in some places, has thin layers of sandy clay, sandy loam, or loamy sand within a depth of 60 inches. It is slightly acid to neutral.

Karnak soils are in positions on the landscape similar to those of Bonnie and Okaw soils. Karnak soils are clay or silty clay within a depth of 60 inches, and Bonnie soils are silt loam. Karnak soils lack the silt loam surface layer that Okaw soils have.

426—Karnak silty clay. This nearly level soil is on broad flats and in depressions on the Kaskaskia River

flood plain. Individual areas are large and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are areas of soils that have a thin silty overwash less than 12 inches thick and areas that have a very strongly acid surface layer.

Slow to very slow permeability, wetness, and high clay content are limitations to the use of this soil. Controlling flooding and ponding and maintaining fertility and tilth are the main concerns of management. A system of surface drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIIw–5; woodland group 3w.

Landes Series

The Landes series consists of gently sloping, moderately well drained and well drained soils that formed in loamy and sandy alluvial material under grasses. These soils are mainly on bottom lands and low terraces on the Mississippi River flood plain.

In a representative profile the surface layer is very dark grayish brown fine sandy loam about 13 inches thick. The subsoil is very dark grayish brown fine sandy loam in the upper 4 inches and dark brown loamy fine sand in the lower 15 inches. The underlying material is dark brown loamy fine sand and pale brown fine sand.

Organic-matter content is moderate. Permeability is moderately rapid to rapid, and available water capacity is moderate. Runoff is slow.

Landes soils are suited to farming. They are suited to open-land and woodland wildlife but are unsuited to wetland wildlife. Most areas of these soils are used for crops, but some areas are in nonfarm uses. Limitations for many nonfarm uses are slight when the soils are protected from flooding.

Representative profile of Landes fine sandy loam, 1 to 6 percent slopes, in a cultivated field, 1,410 feet west and 3,000 feet south of the northeast corner of sec. 6, T. 2 N., R 9 W.:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; neutral; clear smooth boundary.

A12—6 to 13 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate thick platy structure in the upper part grading to weak fine granular structure in the lower part; friable; neutral; clear smooth boundary.

B1—13 to 17 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium subangular blocky structure parting to weak very fine subangular blocky; friable; patchy very dark grayish brown (10YR 3/2) films on ped faces; neutral; clear smooth boundary.

B21—17 to 25 inches; dark brown (10YR 4/3) loamy fine sand; weak coarse and medium subangular blocky structure parting to weak very fine subangular blocky; friable; few very dark grayish brown (10YR 3/2) roots and pore fillings; slightly acid; gradual smooth boundary.

B22—25 to 32 inches; dark brown (10YR 4/3) loamy fine sand; few medium faint dark yellowish brown (10YR 4/4) mottles and common fine faint brown (10YR 5/3) and yellowish brown (10YR 5/4) mottles; weak medium and coarse subangular blocky structure parting to weak very fine subangular blocky; friable; few very dark grayish brown (10YR 3/2) roots and pore fillings; neutral; gradual smooth boundary.

C1—32 to 45 inches; dark brown (10YR 4/3) loamy fine sand; common medium faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure parting to single grained; friable; neutral; gradual smooth boundary.

C2—45 to 60 inches; pale brown (10YR 6/3) fine sand; single grained; very friable to loose; strong effervescence; moderately alkaline.

The A horizon is dark brown and very dark grayish brown and is 10 to 20 inches thick. The C horizon is loamy fine sand, fine sandy loam, and fine sand. It is slightly acid to moderately alkaline.

Landes soils are in positions on the landscape similar to those of Riley soils. Landes soils have more sand in the surface layer and subsoil than Riley soils.

304B—Landes fine sandy loam, 1 to 6 percent slopes. This nearly level to sloping soil is mainly on ridges. Individual areas are generally long and narrow.

Included with this soil in mapping are small areas of Riley soils on wide ridges. Also included are areas of soils that are light colored and are more sandy than this Landes soil.

Runoff is slow, and the hazard of erosion is slight. Maintaining fertility and tilth and conserving moisture are the main concerns of management. Although it is somewhat droughty, this soil is suited to most crops in the county. Management group IIIs–1; woodland group 1o.

Littleton Series

The Littleton series consists of nearly level, somewhat poorly drained soils that formed mainly in water-deposited silty sediment under grasses. These soils are mainly on foot slopes along the bluffs in the Mississippi River valley.

In a representative profile the surface layer is very dark grayish brown and very dark brown silt loam about 26 inches thick. The subsoil is mainly dark grayish brown silt loam about 21 inches thick. It has dark brown films on ped faces. The underlying material is mottled, grayish brown silt loam.

Organic-matter content is high. Permeability is moderate, and available water capacity is very high. Runoff is slow to medium.

Littleton soils are well suited to farming. They are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Most areas of these soils are used for corn, sweet corn, tomatoes, horseradish, soybeans, and wheat. Some areas are in nonfarm uses.

Representative profile of Littleton silt loam, 0 to 2 percent slopes, in a cultivated field, 2,870 feet east and 1,950 feet south of the northwest corner of sec. 6, T. 2 N., R. 8 W.:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) when dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A12—6 to 11 inches; very dark brown (10YR 2/2) silt loam; weak medium platy structure parting to moderate medium granular; friable; neutral; clear smooth boundary.

A13—11 to 26 inches; very dark brown (10YR 2/2) silt loam; weak medium subangular blocky structure parting to moderate medium granular; friable; medium acid; clear smooth boundary.

B2—26 to 30 inches; dark grayish brown (10YR 4/2) silt loam; weak medium and coarse subangular blocky structure; friable; continuous dark brown (10YR

3/3) films on ped faces; medium acid; gradual smooth boundary.

B3—30 to 47 inches; dark grayish brown (10YR 4/2) silt loam; weak coarse subangular blocky structure parting to massive; friable; patchy dark brown (10YR 3/3) films on ped faces; few soft iron concretions; medium acid; clear smooth boundary.

C—47 to 60 inches; grayish brown (10YR 5/2) silt loam; few medium faint brown (7.5YR 5/4) mottles; massive; friable; neutral.

The Ap horizon ranges from black to very dark grayish brown silt loam and is 24 to 36 inches thick. The B horizon ranges from dark grayish brown to brown. It is medium acid to neutral. Depth to the C horizon ranges from 30 to 50 inches. The C horizon is slightly acid to mildly alkaline.

Littleton soils formed in the same kind of material in which Worthen soils formed. Littleton soils are somewhat poorly drained, whereas Worthen soils are well drained. Littleton soils are on foot slopes along the bluffs in the Mississippi River valley, and Worthen soils are in more sloping areas adjacent to the bluffs.

81A—Littleton silt loam, 0 to 2 percent slopes. This nearly level soil is on foot slopes adjacent to the Mississippi River bluffs. Individual areas are moderately small and are irregular in shape.

Included with this soil in mapping are small areas of soils that are gently sloping and are somewhat better drained than this Littleton soil. Also included are a few small areas of soils that are moderately alkaline and calcareous; these areas are indicated by a spot symbol on the soil map. Also included are areas of soils that have fine textured material between depths of 47 and 60 inches and several large areas of soils that have light colored silty sediment, 10 to 20 inches thick, deposited on the dark colored surface layer.

A seasonal high water table is a limitation to the use of this soil. Controlling runoff from adjacent uplands and maintaining tilth and fertility are the main concerns of management. This soil is suited to most crops grown in the county. Management group I–1; woodland group 2o.

Martinsville Series

The Martinsville series consists of nearly level to sloping, well drained soils that formed in sandy and silty material under a hardwood forest. These soils are mainly on low lying terraces on the Kaskaskia River flood plain.

In a representative profile the surface layer is brown loam about 8 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil, about 30 inches thick, is strong brown silt loam and silty clay loam in the upper part and brown and strong brown sandy loam in the lower part. The underlying material is strong brown, stratified sand and silt.

Organic-matter content is low. Permeability and available water capacity are moderate. Runoff is slow.

Martinsville soils are well suited to farming. They are well suited to open-land and woodland wildlife but are very poorly suited to wetland wildlife. Most areas of these soils are used for corn and soybeans. Limitations for many nonfarm uses are severe because of flooding.

Representative profile of Martinsville loam, 1 to 7 percent slopes, in a cultivated field, 1,020 feet east and 2,180 feet south of the northwest corner of sec. 35, T. 1 S., R. 6 W.:

Ap—0 to 8 inches; brown (10YR 4/3) loam; moderate medium platy structure; friable; numerous roots and pores; neutral; abrupt smooth boundary.

A2—8 to 12 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common worm casts; numerous roots and pores; neutral; clear smooth boundary.

B1t—12 to 17 inches; strong brown (7.5YR 5/6) heavy silt loam; moderate fine angular and subangular blocky structure; friable; common roots, few fine pores; continuous dark brown (7.5YR 4/2) clay films on ped faces; neutral; clear smooth boundary.

B21t—17 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine prismatic structure parting to moderate to strong medium subangular blocky; firm; continuous dark brown (7.5YR 4/2) clay films on ped faces; few roots; few fine pores; neutral; gradual smooth boundary.

B22t—24 to 32 inches; strong brown (7.5YR 5/8) silty clay loam; moderate medium angular blocky structure; friable to firm; very few fine roots, few fine pores; nearly continuous dark reddish gray (5YR 4/2) clay films on ped faces; neutral; clear smooth boundary.

IIB23t—32 to 37 inches; brown (7.5YR 5/4) sandy loam; few medium prominent strong brown (7.5YR 5/6) and reddish brown (5YR 4/3) mottles; moderate coarse subangular blocky structure; firm; discontinuous dark reddish gray (5YR 4/2) clay films on ped faces; very few fine roots; neutral; clear smooth boundary.

IIB3—37 to 42 inches; strong brown (7.5YR 5/6) sandy loam; many fine distinct light yellowish brown (10YR 6/4) and brown (7.5YR 4/4) mottles; weak medium prismatic structure; firm; thick yellowish brown (10YR 5/4) silt grains on vertical ped faces; neutral; clear smooth boundary.

IIC—42 to 71 inches; strong brown (7.5YR 5/6) stratified sands and silt; many fine distinct light brownish gray (10YR 6/2) mottles; massive; friable; neutral.

The Ap horizon is dark grayish brown and brown and is 6 to 9 inches thick. It is loam, very fine sandy loam, or silt loam. The A2 horizon is light yellowish brown and yellowish brown and is silt loam or fine sandy loam, 3 to 6 inches thick. The B horizon is heavy silt loam and silty clay loam in the upper part and loam, sandy clay loam, or sandy loam in the lower part. The IIC horizon is at a depth of 40 to 60 inches.

Martinsville soils formed in positions on the landscape similar to those of Hurst soils. Martinsville soils have more sand throughout the profile than Hurst soils. They are well drained, whereas Hurst soils are somewhat poorly drained.

570B—Martinsville loam, 1 to 7 percent slopes. This nearly level to sloping soil is mainly in areas that border the bottom lands of the Kaskaskia River flood plain. Individual areas are relatively small and are irregular in shape.

Included with this soil in mapping are areas of somewhat poorly drained soils and some areas of soils that are silty throughout the solum and are underlain by medium sand.

Runoff is slow to medium, and the hazard of erosion is slight. However, because of its low topographic position, this soil is subject to occasional flooding. Maintaining fertility is the main concern of management. This soil is well suited to corn and soybeans. Management group IIe–3; woodland group 1o.

Muscatine Series

The Muscatine series consists of nearly level, somewhat poorly drained soils that formed in silty deposits under prairie grasses. These soils are mainly in slightly elevated areas in the prairie regions of the county.

In a representative profile the surface layer is very dark brown and very dark gray silt loam about 16 inches thick. The upper 4 inches of the subsoil is very dark grayish brown light silty clay loam; the lower 24 inches is dark yellowish brown, yellowish brown, and light brownish gray silty clay loam. Light brownish gray and yellowish brown mottles are throughout most of the subsoil. The underlying material is light brownish gray silt loam that has yellowish brown mottles.

Organic-matter content is high. Permeability is moderate, and available water is very high.

Muscatine soils are well suited to farming. They are well suited to open-land and woodland wildlife and are suited to wetland wildlife. These soils have no natural woodlands. Most areas are used for corn and soybeans, but urban development is taking place at a rapid rate. Limitations for many nonfarm uses are moderate to severe.

Representative profile of Muscatine silt loam, 0 to 3 percent slopes, in a cultivated field, 1,152 feet east and 195 feet south of the center of sec. 28, T. 2 N., R. 8 W.:

A11—0 to 10 inches; very dark brown (10YR 2/2) silt loam, dark gray to gray (10YR 4/1) when dry; moderate fine crumb structure; friable; medium acid; clear smooth boundary.

A12—10 to 16 inches; very dark gray (10YR 3/1) silt loam; moderate fine crumb structure; friable; medium acid; clear smooth boundary.

B1—16 to 20 inches; very dark grayish brown (10YR 3/2) light silty clay loam; few fine prominent yellowish red (5YR 4/8) mottles and common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine subangular blocky structure; friable to firm; thick continuous very dark gray (10YR 3/1) clay films on ped faces; medium acid; clear smooth boundary.

B21t—20 to 31 inches; dark yellowish brown (10YR 3/4) silty clay loam; common medium distinct yellowish brown (10YR 5/4 and 5/6), brownish yellow (10YR 6/6), and light brownish gray (2.5Y 6/2) mottles and fine medium distinct dark grayish brown (2.5Y 4/2) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; thick continuous very dark gray (10YR 3/1) organic clay coatings; medium acid; clear smooth boundary.

B22t—31 to 41 inches; mixed yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) silty clay loam; weak medium prismatic structure parting to weak coarse subangular blocky; firm; discontinuous dark gray (10YR 4/1) clay films on ped faces; pore fillings and root channels; slightly acid; clear smooth boundary.

B3—41 to 44 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; friable to firm; patchy dark gray (10YR 4/1) clay films on ped faces and pore fillings; patchy reddish brown (5YR 4/3) and very dark gray (10YR 3/1) clay films on some ped faces; neutral; gradual smooth boundary.

C—44 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; dark gray (10YR 4/1) pore fillings; neutral.

The A horizon ranges from very dark grayish brown to black and is 13 to 19 inches thick. The B horizon is very dark gray, dark yellowish brown, dark gray, grayish brown, brownish yellow, or dark brown. It is medium acid to neutral. The C horizon is at a depth of 40 to 60 inches. It is medium acid to moderately alkaline.

Muscatine soils formed in the same kind of material in which Tama soils formed. Muscatine soils are somewhat poorly drained, whereas Tama soils are well drained.

41A—Muscatine silt loam, 0 to 3 percent slopes. This nearly level soil is in slightly elevated areas in the prairie regions of the county. Individual areas are small to moderately large and are generally oval.

Included with this soil in mapping are some small areas of soils that have little or no mottling in the upper part of the subsoil.

Maintaining fertility and tilth is a major concern of management. In some places, spring tillage is delayed because of wetness. This soil is suited to most crops grown in the county. Management group I–1; woodland group 1o.

U41B—Muscatine-Urban land complex, 1 to 4 percent slopes. This complex consists of silty, nearly level and gently sloping Muscatine silt loam that has been partly disturbed by urban development. Most areas are on relatively broad ridgetops within the urbanized area in the county. Vegetation is a mixture of lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Muscatine silt loam, 20 percent Urban land, and 30 percent areas that have been modified by covering Muscatine silt loam with fill or by grading. In undisturbed areas the Muscatine silt loam in this complex has the profile described as representative for the series. Most of the Urban land is covered by buildings and pavement. In modified areas the fill material is silty or clayey, depending upon which layer it was taken from, and generally comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of well drained soils and a few very small areas of poorly drained soils.

These soils have moderate and slight limitations for many urban uses. During construction, some areas have a high water table, some excavations fill with water, and undulating areas are subject to erosion. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

Okaw Series

The Okaw series consists of nearly level, poorly drained soils that formed in thin silty deposits and clayey alluvial sediment under a hardwood forest. These soils are on low lying terraces along the Kaskaskia River.

In a representative profile the surface layer is dark gray silt loam about 4 inches thick. The subsurface layer is gray silty clay loam about 4 inches thick. The subsoil is about 66 inches thick. The upper part of the subsoil is dark gray silty clay that has brownish yellow and dark grayish brown mottles, and the lower part is dark grayish brown to grayish brown silty clay to clay that has faint brown, dark brown, and grayish brown mottles.

Organic-matter content is low. Permeability is very slow, and available water capacity is moderate. Runoff is slow to ponded.

Okaw soils are suited to farming if they are fertilized and drained. Drained areas are suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife, are suited to woodland wildlife, and are well suited to wetland wildlife. These soils are generally

fairly well suited to woodland. Most areas are in severely cutover woodland (fig. 7), but some areas have been cleared of trees and are used for corn and soybeans. Limitations for many nonfarm uses are severe.

Representative profile of Okaw silt loam, in a cultivated field, 2,577 feet south and 2,000 feet west of the northeast corner of sec. 17, T. 3 S., R. 7 W.:

A1—0 to 4 inches; dark gray (10YR 4/1) silt loam; few fine prominent dark brown to brown (7.5YR 4/4) mottles; moderately fine and very fine crumb structure; friable; very strongly acid; abrupt smooth boundary.

A2—4 to 8 inches; gray (10YR 5/1) silty clay loam; few fine distinct dark brown to brown (7.5YR 4/4) mottles; moderate to strong fine angular blocky structure; friable; very strongly acid; abrupt smooth boundary.

B21t—8 to 23 inches; dark gray (10YR 4/1) silty clay; common fine distinct brownish yellow (10YR 6/6) mottles; weak medium prismatic structure parting to weak to moderate fine angular blocky; common slickensides; very firm; very strongly acid; gradual smooth boundary.

B22t—23 to 33 inches; dark gray (10YR 4/1) silty clay; many fine faint dark grayish brown (10YR 4/2) mottles; weak medium angular blocky structure; numerous slickensides; very firm; very strongly acid; gradual smooth boundary.

B23t—33 to 52 inches; dark grayish brown (10YR 4/2) silty clay; common medium distinct gray (5Y 6/1) mottles and few fine prominent dark brown (7.5YR 4/4) and grayish brown (2.5Y 5/2) mottles; weak medium to coarse prismatic structure; few slickensides; very firm; very strongly acid; gradual smooth boundary.

B3—52 to 74 inches; grayish brown (2.5Y 5/2) silty clay to clay; few fine faint brown (10YR 5/3) mottles; moderate to strong fine angular blocky; firm; numerous black iron-manganese concretions; medium acid.

The Ap horizon ranges from gray to dark grayish brown. The A2 horizon ranges from gray to light gray. The B horizon ranges from light brownish gray to dark grayish brown fine silty clay loam to clay. It is very strongly acid to neutral. The C horizon is at a depth of 30 to 74 inches or more. It is very strongly acid to neutral.

Okaw soils formed in the same kind of material in which Hurst soils formed. Okaw soils are poorly drained and are on low lying terraces, whereas Hurst soils are somewhat poorly drained and are generally in sloping areas.

84—Okaw silt loam. This nearly level soil is on terraces along the Kaskaskia River. Some areas are depressional. Individual areas are relatively large and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are areas of soils that have less clay in the upper part of the subsoil than this Okaw soil and some small areas of soils in which the surface layer has a high clay content. Also included are areas of soils that are somewhat better drained than this Okaw soil.

Very slow permeability, seasonal wetness, and ponding in the depressions are limitations to the use of this soil. Maintaining fertility and tilth is a concern of management. A system of surface drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIIw–3; woodland group 4w.

Figure 7.—**Cutover woodland on Okaw silt loam. Tree cover is dominantly post oak, so the area is called "Post Oak Flats."**

Onarga Series

The Onarga series consists of nearly level to gently sloping, well drained soils that formed in sandy material under grasses. They are mainly on low terraces in the Kaskaskia River flood plain.

In a representative profile the surface layer is dark brown fine sandy loam about 19 inches thick. The subsoil is dark brown, strong brown, and brown heavy fine sandy loam. It has distinct dark brown clay films on structure surfaces. The underlying material is stratified brown and dark yellowish brown sand and brown silt.

Organic-matter content is moderate. Permeability is moderate to moderately rapid, and available water capacity is moderate. Surface runoff is slow.

Onarga soils are well suited to farming. They are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Most areas of these soils are used for corn and soybeans. Limitations for most nonfarm uses are slight.

Representative profile of Onarga fine sandy loam, 1 to 4 percent slopes, in a cultivated field, 20 feet west and 2,800 feet south of the northeast corner of sec. 13, T. 1 S., R. 6 W.:

Ap—0 to 8 inches; dark brown (7.5YR 3/2) fine sandy loam; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

A11—8 to 14 inches; dark brown (7.5YR 3/2) fine sandy loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

A12—14 to 19 inches; dark brown (7.5YR 3/2) fine sandy loam; weak to moderate fine granular structure; friable; strongly acid; clear smooth boundary.

B1—19 to 23 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; continuous dark brown (7.5YR 3/2) films on ped faces; strongly acid; clear smooth boundary.

B21t—23 to 32 inches; dark brown (7.5YR 4/4) heavy fine sandy loam; moderate fine subangular blocky structure; friable; continuous dark brown (7.5YR 3/2) films on ped faces; dark brown (7.5YR 3/2) pore fillings; medium acid; clear smooth boundary.

B22t—32 to 38 inches; strong brown (7.5YR 5/6) heavy fine sandy loam; moderate fine subangular blocky structure; friable; discontinuous dark brown (7.5YR 3/2) films on ped faces; dark brown (7.5YR 3/2) pore fillings; strongly acid; clear smooth boundary.

B23t—38 to 45 inches; brown (7.5YR 5/4) heavy fine sandy loam; few fine faint yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; discontinuous brown (7.5YR 4/4) films on ped faces; strongly acid; abrupt smooth boundary.

C—45 to 60 inches; stratified brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) sand and brown (7.5YR 4/4) silt; common fine distinct strong brown (7.5YR 5/8) mottles and many fine distinct pale brown (10YR 6/3) mottles in silt part; massive; friable; dark brown (7.5YR 3/2) and black (10YR 2/1) specks and splotches associated with iron and manganese; strongly acid.

The A horizon is very dark grayish brown and dark brown fine sandy loam 12 to 20 inches thick. The B horizon is brown to strong brown heavy fine sandy loam or heavy sandy loam and 24 to 36 inches thick. The C horizon is at a depth of 36 to 50 inches.

Onarga soils are in slightly elevated positions on the landscape that are similar to those of Hurst, sandy substratum, soils and Okaw soils. Onarga soils have sandy material in all horizons and are well drained, whereas Hurst, sandy substratum, soils have silt and clay in the A and B horizons and are somewhat poorly drained and Okaw soils have no sand within a depth of 60 inches and are poorly drained.

150B—Onarga fine sandy loam, 1 to 4 percent slopes. This nearly level to gently sloping soil is on low terraces somewhat above the light colored soils that generally surround it. Individual areas are relatively small and are irregular in shape.

Included with this soil in mapping are some small areas of soils that have thin sandy layers over fine textured sediment. Also included are some small areas of lighter colored soils and soils that are not so well drained.

The hazard of erosion is slight. Controlling erosion and maintaining fertility are the main concerns of management. This soil is well suited to corn and soybeans. Management group IIe–3; woodland group 1o.

Orthents

802—Orthents, loamy. This soil is on nearly level ridgetops and on strongly sloping side slopes. Slopes are 1 to 15 percent. It consists of sandy and silty material that has been spoiled as the result of dredging the new Kaskaskia River navigation canal and constructing grade separations and ramps for some interstate highways and levees. Individual areas are 5 to 40 acres in size. The canal spoils are sparsely covered with grasses and such trees as willow, sycamore, and cottonwood.

The sandy material is subject to soil blowing and erosion. Establishment of vegetation is essential to reduce sediment production. The soil is slightly acid to moderately alkaline. Management group VIs–1; not assigned to a woodland group.

801C—Orthents, silty, 3 to 10 percent slopes. This soil is in areas that have been stripped for coal and graded for tillable land. It is also in areas of construction for grade separations, ramps, and rights-of-way for the interstate road system. Texture is silt loam to silty clay loam, and reaction is mainly medium acid to neutral. In areas that are mined, all exposed rock, stones, and boulders that are more than 8 inches in diameter are buried or removed, except for the shale that disintegrates in less than 5 years.

Included with this soil in mapping are moderately alkaline spots and local areas that are loamy.

The strip mined areas comply with the requirements for reclamation as described by Illinois law, and normal farm machinery can be used on the surface. Management group IIIe–4; not assigned to a woodland group.

801G—Orthents, silty, 30 to 60 percent slopes. This soil is on ungraded land that has been stripped for coal. In some areas the narrow ridgetops have been widened and leveled and are in trees and grasses (fig. 8). Texture is silt loam and silty clay loam, and reaction is mainly medium acid to neutral.

Included with this soil in mapping are moderately alkaline spots and local areas that are loamy.

A few boulders and stones are exposed on the surface and, in places, interfere with cultivation. Slopes are critical, and soil slippage, or sloughing, is common. Management group VIIe–2; not assigned to a woodland group.

Otter Series

The Otter series consists of nearly level, poorly drained soils that formed in silty material under

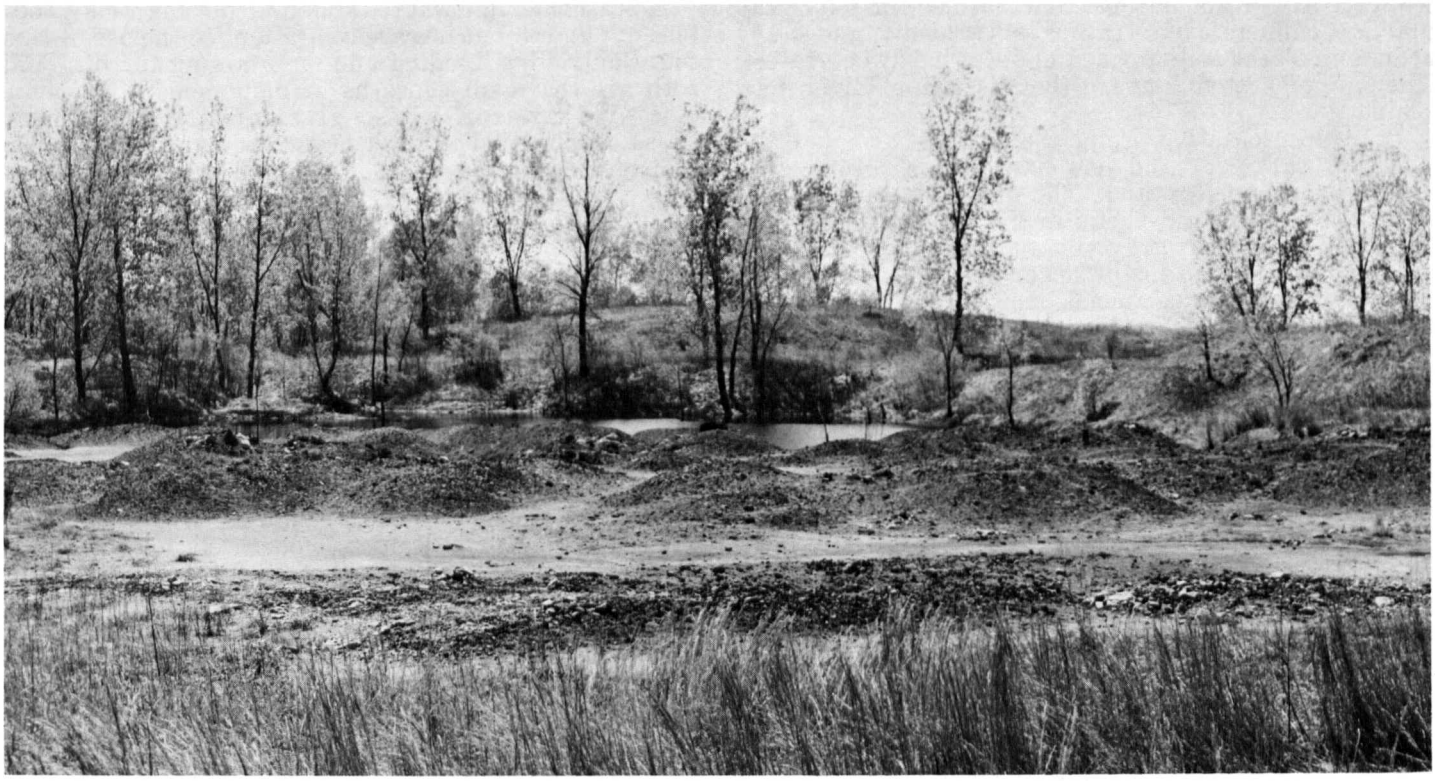


Figure 8.—**Strip mined area of Orthents, silty, 30 to 60 percent slopes. This area was mined prior to passage of the present Illinois reclamation act. Part of this area has become naturally vegetated to grasses and trees.**

grasses and forest. These soils are mainly on small stream bottom lands that extend into areas of soils that formed under grasses.

In a representative profile the surface layer is very dark grayish brown to very dark gray silt loam about 46 inches thick. The underlying material is mottled, dark gray silt loam.

Organic-matter content is high. Permeability is moderate, and available water capacity is high. Runoff is slow.

Otter soils are well suited to farming. Because of flooding, they are better suited to summer crops than to small grain. They are well suited to open-land, woodland, and wetland wildlife. Most areas of these soils are used for corn and soybeans. Limitations for most nonfarm uses are severe.

Representative profile of Otter silt loam, in a cultivated field, 250 feet north and 300 feet west of the southeast corner of sec. 23, T. 1 N., R. 6 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

A12—8 to 27 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable; thin dark grayish brown (10YR 4/2) silt strata; slightly acid; clear smooth boundary.

A13—27 to 35 inches; very dark gray (10YR 3/1) silt loam; weak to moderate fine granular structure; friable; slightly acid; gradual smooth boundary.

A14—35 to 46 inches; very dark gray (10YR 3/1) silt loam; weak fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

C—46 to 60 inches; dark gray (10YR 4/1) silt loam; many coarse faint very dark gray (10YR 3/1) mottles or splotches; appears massive; friable; few iron concretions; slightly acid.

The Ap horizon is very dark grayish brown and black. The A horizon is 30 to 48 inches thick and is medium acid to mildly alkaline. Some profiles are stratified with very thin lenses of silt, silt loam, or very fine sand that are lighter colored than the main part of the layer.

Otter soils are near Herrick and Piasa soils. Otter soils are on relatively narrow bottom lands, and Herrick and Piasa soils are on the bordering uplands. Otter soils are poorly drained and dark or very dark colored, whereas Herrick soils are somewhat poorly drained and moderately dark colored and Piasa soils are poorly drained and moderately dark colored. Otter soils have a thicker surface layer than Herrick and Piasa soils.

76—Otter silt loam. This nearly level soil is on narrow bottom lands. Individual areas are relatively narrow and long. Slopes are 0 to 2 percent.

Included with this soil in mapping are some small areas of lighter colored Wakeland soils. Also included are areas of soils that have a surface layer of dark colored silt loam less than 26 inches thick and have fine, light gray and gray mottles in the lower part of the surface layer.

Seasonal wetness is a limitation to the use of this soil. Controlling flooding and maintaining fertility and tilth are the main concerns of management. Flooding severely limits small grain production. This soil is well suited to corn and soybeans. Management group IIw–3; woodland group 2w.

Parkville Series

The Parkville series consists of nearly level, some-

what poorly drained soils that formed in silty clay alluvial sediment over stratified silty, loamy, and sandy sediment. These soils formed under a hardwood forest. They are on bottom lands of the Mississippi River flood plain.

In a representative profile the surface layer is black and very dark gray and very dark grayish brown silty clay about 15 inches thick. The underlying material is dark brown fine sandy loam in the upper 5 inches and stratified very dark gray silt and silty clay loam and grayish brown sand in the lower part. The lower part of the underlying material has very dark grayish brown and dark brown mottles.

Organic-matter content is high. Permeability is very slow and slow in the upper 15 inches and moderate to moderately rapid below. Available water capacity is moderate. Runoff is slow.

Parkville soils are suited to most crops grown in the county. They are suited to open-land wildlife, are well suited to woodland wildlife, and are poorly suited to wetland wildlife. Parkville soils are used for both farm and nonfarm uses. Limitations for many nonfarm uses are severe because of a seasonal high water table and flooding.

Representative profile of Parkville silty clay, State Plane Coordinates, 692,100 feet north and 487,770 feet east (Illinois west zone), (unsurveyed) T. 1 N., R. 10 W.:

Ap—0 to 5 inches; black (10YR 2/1) silty clay; weak medium angular blocky structure; firm; mildly alkaline; abrupt smooth boundary.

A12—5 to 15 inches; mixed very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silty clay; moderate medium angular blocky structure; firm; mildly alkaline; abrupt smooth boundary.

IIC1—15 to 20 inches; dark brown (10YR 4/3) fine sandy loam; few fine faint dark brown (10YR 3/3) mottles; weak fine crumb structure parting to massive; very friable; many fine pores; numerous worm casts; strong effervescence; moderately alkaline; abrupt smooth boundary

IIIC2—20 to 60 inches; stratified very dark gray (10YR 3/1) silt and light silty clay loam and grayish brown (10YR 5/2) sand; few medium distinct very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) mottles in the lower part; massive; very friable; mainly sand strata; strong effervescence; moderately alkaline.

The Ap horizon ranges from black to very dark gray and is 5 to 12 inches thick. The A12 horizon is dark grayish brown to grayish brown. The thickness of the A horizon is 15 to 30 inches. The IIC horizon is fine sandy loam to sand and has strata of fine sandy loam, silt, silty clay loam, or sand in places. It ranges from dark brown to very dark gray, grayish brown, or very dark grayish brown and is medium acid to moderately alkaline.

Parkville soils are in positions on the landscape similar to those of Darwin variant soils and Riley soils. Parkville soils have coarse textured material within a depth of 30 inches, and Darwin variant soils have loamy material at a depth of more than 30 inches. Parkville soils have a surface layer of silty clay, and Riley soils have a surface layer of silty clay loam.

619—Parkville silty clay. This nearly level soil is on flood plains of the American Bottoms along the Mississippi River. Individual areas are generally large and are long. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of soils that are underlain by silty sediment. Also included are some small areas of Darwin soils that have a thick surface layer.

A seasonal high water table and the high clay content in upper 30 inches are limitations to the use of this soil. Controlling flooding and maintaining fertility and tilth are the main concerns of management. In some places the hazard of Johnsongrass infestation is serious. This soil is suited to most crops grown in the county. Management group IIw–3; woodland group 3w.

Piasa Series

The Piasa series consists of nearly level, poorly drained soils that have a high sodium content. These soils formed in silty material under grasses. They are on uplands.

In a representative profile the surface layer is very dark gray silt loam about 9 inches thick. The subsoil is mainly grayish brown silty clay loam. It is about 44 inches thick and has brown, yellowish brown, and strong brown mottles. The underlying material is grayish brown silt loam that has yellowish brown mottles.

Organic-matter content is moderately low. Permeability is slow to very slow, and available water capacity is low. Runoff is slow.

Piasa soils are suited to farming. Because of the high sodium content, they are better suited to wheat and soybeans than to corn. They are suited to open-land wildlife, are poorly suited to woodland wildlife, and are suited to wetland wildlife. Piasa soils are generally used for corn, soybeans, and wheat. Limitations for many nonfarm uses are severe because of permeability, seasonal wetness, and poor physical and chemical properties.

Representative profile of Piasa silt loam, 90 feet south and 1,079 feet east of the center of sec. 24, T. 2 N., R. 6 W.:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam; weak to moderate fine and very fine crumb structure; friable; neutral; abrupt smooth boundary.

B1—9 to 18 inches; grayish brown (10YR 5/2) light silty clay loam; common fine faint brown (10YR 5/3) mottles; moderate fine and very fine blocky structure; friable to firm; many grayish brown (10YR 5/2) silt grains, light gray (10YR 7/1) when dry, and thin discontinuous grayish brown (10YR 5/2) clay films on ped faces; moderately alkaline; clear smooth boundary.

B21t—18 to 24 inches; mixed dark grayish brown (10YR 4/2), brown (10YR 5/3), and yellowish brown (10YR 5/6) silty clay loam; moderate to weak medium and fine subangular blocky structure; firm; few light gray (10YR 7/1) silt grains when dry, which disappear on wetting, and continuous dark grayish brown (10YR 4/2) clay films on ped faces; moderately alkaline; clear smooth boundary.

B22t—24 to 29 inches; grayish brown (10YR 5/2) silty clay loam; common fine faint yellowish brown (10YR 5/8) and light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; firm; occasional lime concretions; patchy grayish brown (10YR 5/2) clay films on ped faces; moderately alkaline; gradual smooth boundary.

B23t—29 to 43 inches; grayish brown (10YR 5/2) silty clay loam; many fine faint yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak coarse subangular blocky; firm; thick discontinuous light brownish gray (2.5Y 6/2) clay films on ped faces; moderately alkaline; clear smooth boundary.

B3—43 to 53 inches; grayish brown (2.5Y 5/2) heavy silt loam; few coarse distinct yellowish brown (10YR 5/6) mottles and few coarse prominent strong brown (7.5YR 5/6) mottles; weak medium pris-

matic structure; firm to friable; patchy gray (5Y 6/1) clay films on vertical ped faces; moderately alkaline; gradual smooth boundary.

C—53 to 60 inches; grayish brown (2.5Y 5/2) silt loam; few coarse distinct yellowish brown (10YR 5/4) mottles; massive; friable; few small prominent black (10YR 2/1) iron concretions; moderately alkaline.

The Ap horizon is very dark grayish brown, very dark gray, and dark gray and is 10 to 13 inches thick. The A2 horizon is commonly mixed with the plow layer and is present as silt grains within the B horizon. The B horizon ranges from dark gray to grayish brown and has yellowish brown, strong brown, or brownish yellow mottles. Dark gray and gray silt grains are common on ped faces. The B horizon is strongly acid to moderately alkaline. In some profiles the upper part of the B horizon is strongly acid, but in all profiles some part of the subsoil is moderately alkaline. The C horizon is at a depth of 48 to 60 inches. It is mildly alkaline to strongly alkaline.

Piasa soils formed in the same kind of material in which Herrick, Darmstadt, Virden, and Ebbert soils formed and are in similar positions on the landscape. Piasa soils are poorly drained and have a high sodium content; Herrick soils are somewhat poorly drained but are not influenced by sodium; Darmstadt soils are somewhat poorly drained and also have excess sodium in the subsoil; and Virden and Ebbert soils are poorly drained but do not have excess sodium within the profile.

474—Piasa silt loam. This nearly level soil is on uplands. Slopes are 0 to 2 percent. Individual areas are large and are uniform in shape. This soil generally forms an intricate pattern with soils that do not have a high sodium content, but the mapped areas are more than 70 percent Piasa soils.

Included with this soil in mapping are small areas of soils that have no subsurface layer and small areas of soils that have a surface layer less than 10 inches thick. Also included are a few small areas of nearly level, somewhat poorly drained Darmstadt soils and small areas of Herrick, Virden, and Ebbert soils that do not have a high content of sodium.

The hazard of frost heave is moderate to severe. Seasonal wetness, permeability, the high sodium content, and frost heave are limitations to the use of this soil. Maintaining fertility and tilth is a concern of management. This soil is suited to most crops grown in the county, but is better suited to wheat and soybeans than to most other crops. Low available water capacity affects growth of crops during dry periods. Management group IIIw–2; woodland group 3t.

995—Piasa-Herrick silt loams. These nearly level soils occur in such an intricate pattern in areas that it is not feasible to separate them in mapping. Slopes are 0 to 2 percent.

This complex is about 60 percent Piasa silt loam and 40 percent Herrick silt loam. Piasa soils are slightly lighter colored and are in a somewhat lower position than Herrick soils. They have a layer that is high in sodium within a depth of 40 inches, but Herrick soils do not have this layer. Piasa soils also have a light colored subsurface layer that is lacking in some areas of Herrick soils.

Included with these soils in mapping are a few small areas of soils that have a light colored surface layer that is high in sodium. These areas are locally referred to as scalds, scab spots, or slickspots (fig. 9).

Runoff is slow to ponded. The high sodium content in Piasa soils and wetness on both soils are limitations to the use of these soils. Improving drainage and maintaining tilth and fertility are the main concerns of management. All areas of these soils are cultivated or in nonfarm uses. Most crops grow better on Herrick soils than on Piasa soils, but small grain grows well on both soils. Management group IIIw–2; woodland group 3t.

Figure 9.—**A soil layer that is high in sodium. Poor physical condition of the layer is evident when it is exposed.**

Riley Series

The Riley series consists of nearly level, somewhat poorly drained soils that formed in silty clay loam and loam alluvial sediment less than 30 inches thick over coarse textured sediment. These soils formed under grasses and forest. They are on bottom lands and terraces on the Mississippi River flood plain.

In a representative profile the surface layer is silty clay loam about 12 inches thick. It is very dark brown in the upper part and very dark gray in the lower part. The subsoil is dark grayish brown and dark brown loam. The underlying material is stratified pale brown sand and dark grayish brown silt.

Organic-matter content is moderate. Permeability is moderate in the surface layer and subsoil and rapid in the underlying material. Available water capacity is moderate. Runoff is medium.

Riley soils are suited to the crops commonly grown in the county. They are well suited to open-land and woodland wildlife and are suited to wetland wildlife. They are suited to woodland. Most areas of these soils are used for row crops. Limitations for most nonfarm uses are severe.

Representative profile of Riley silty clay loam in an

idle field, State Plane Coordinates, 696,150 feet north and 489,525 feet east (Illinois west zone), (unsurveyed) T. 1 N., R. 10 W.:

Ap—0 to 6 inches; very dark brown (10YR 2/2) silty clay loam; moderate and strong fine subangular blocky structure parting to moderate and strong fine and very fine crumb; friable to firm; mildly alkaline; abrupt smooth boundary.

A12—6 to 12 inches; very dark gray (10YR 3/1) silty clay loam; massive (plow pan) parting to weak coarse subangular blocky structure; firm; mildly alkaline; abrupt smooth boundary.

B1—12 to 17 inches; dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure parting to moderate fine granular; firm to friable; discontinuous very dark gray (10YR 3/1) films on ped faces, in pores, and as root fillings; mildly alkaline; abrupt smooth boundary.

B2—17 to 24 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure parting to moderate fine granular; firm to friable; nearly continuous very dark gray (10YR 3/1) films on ped faces; mildly alkaline; abrupt smooth boundary.

IIC—24 to 60 inches; very pale brown (10YR 7/3) stratified sands and dark grayish brown (10YR 4/2) silt; loose; moderately alkaline.

The A horizon ranges from silt loam to silty clay loam and is 12 to 30 inches thick. The B horizon ranges from light yellowish brown to dark grayish brown and dark brown. It is slightly acid to mildly alkaline. Depth to the C horizon ranges from 15 to 30 inches. The C horizon is sand or loamy sand that has strata of sandy loam, silt loam, or silty clay loam in places. It is neutral to moderately alkaline.

Riley soils are in positions on the landscape similar to those of Gorham and Landes soils. Riley soils have a finer textured surface layer than Landes soils. They have coarse textured material at a depth of less than 30 inches, whereas Gorham soils have coarse textured material at a depth of more than 30 inches.

452—Riley silty clay loam. This nearly level soil is on the Mississippi River flood plain. Slopes are 0 to 2 percent. It is at a somewhat lower elevation than Landes soils and a somewhat higher elevation than Gorham soils. Individual areas are somewhat large and are irregular in shape. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of soils that have a thin sandy deposit on the surface. Also included are small areas of Gorham soils that are deeper to the underlying sandy material, areas of silty soils, and some areas of soils that are moderately well drained and have brighter colors.

Seasonal wetness is a limitation to the use of this soil. Controlling flooding and maintaining fertility and tilth are the main concerns of management. The hazard of Johnsongrass infestation is serious in many areas. This soil is suited to most crops grown in the county. Management group IIw-3; woodland group 2o.

U452—Riley-Urban land complex. This complex consists of silty, nearly level to undulating Riley soils that have been partly disturbed by urban development. Slopes are 0 to 2 percent. Most areas are on relatively broad ridges in the urbanized area of the American Bottoms. Vegetation is lawn grasses, trees, and shrubs.

This complex is about 50 percent undistributed Riley soils, 20 percent Urban land, and 30 percent areas that have been modified by covering Riley soils with fill or by grading. A Riley soil in an undisturbed area of this complex has the profile described as representative of the series. Most of the Urban land is covered by buildings and pavement. In modified areas the fill material is variable, depending upon which layer of the Riley soil it was taken from or if it comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of gently sloping, well drained, sandy Landes soils and areas of nearly level, poorly drained Gorham soils in sloughs.

When protected from flooding by levees, these soils have moderate limitations for many urban uses. Because of the sandy substratum, domestic water supplies can be polluted in places. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

Sable Series

The Sable series consists of nearly level, poorly drained soils that formed in silty deposits under prairie grasses. These soils are mainly in depressions on the uplands in the prairie regions of the county.

In a representative profile the surface layer is black silty clay loam about 15 inches thick. The subsoil is mainly silty clay loam, and it is about 37 inches thick. The upper part of the subsoil is mainly dark gray and has olive mottles, and the lower part is light olive brown and grayish brown and has yellowish brown mottles. The underlying material is gray to grayish brown silt loam that has yellowish brown and strong brown mottles.

Organic-matter content is high. Permeability is moderate, and available water capacity is very high. Runoff is slow.

Sable soils are well suited to farming if they are drained. Drained areas are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife, are suited to woodland wildlife, and are well suited to wetland wildlife. These soils have no natural woodlands. Most areas are used for corn and soybeans. Limitations for many nonfarm uses are severe.

Representative profile of Sable silty clay loam, in a cultivated field, 660 feet west and 1,320 feet south of the center of sec. 30, T. 1 N., R. 6 W.:

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam dark gray (10YR 4/1) when dry; weak coarse granular structure; friable; many roots and worm casts; neutral; abrupt smooth boundary.

A12—8 to 15 inches; black (10YR 2/1) silty clay loam; moderate coarse granular structure parting to moderate fine subangular blocky; friable to firm; many roots and worm casts; neutral; clear smooth boundary.

B21g—15 to 21 inches; black (10YR 2/1) silty clay loam; few dark yellowish brown (10YR 4/4) patches; moderate fine to medium subangular blocky structure; firm; common roots; discontinuous black (10YR 2/1) clay coatings on ped faces; few fine soft strong brown (7.5YR 5/8) iron concretions; neutral; clear smooth boundary.

B22g—21 to 28 inches; dark gray (2.5Y 4/1) silty clay loam; many coarse distinct olive (5Y 5/3) mottles; strong fine to medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; common roots; continuous black (10YR 2/1) clay coatings on ped faces; few fine soft black

(10YR 2/1) and many strong brown (7.5YR 5/8) iron-manganese concretions; neutral; gradual smooth boundary.

B23g—28 to 37 inches; dark gray (2.5Y 4/1) and olive (5Y 5/3) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure breaking to moderate medium subangular blocky; firm; common roots; discontinuous very dark gray (10YR 3/1) clay coatings on ped faces; few fine and coarse black (10YR 2/1) iron-manganese concretions; slightly acid; gradual smooth boundary.

B31g—37 to 45 inches; light olive brown (2.5Y 5/4) to light yellowish brown (2.5Y 6/4) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; occasional roots; discontinuous very dark gray (10YR 3/1) to dark gray (10YR 4/1) clay coatings on ped faces; few fine and coarse soft black (10YR 2/1) iron-manganese concretions; neutral; clear smooth boundary.

B32g—45 to 52 inches; grayish brown (2.5Y 5/2) heavy silt loam; many medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; occasional roots; discontinuous dark gray (2.5Y 4/1) clay coatings on ped faces; few fine and coarse soft black (10YR 2/1) iron and manganese concretions; neutral; diffuse smooth boundary.

C—52 to 60 inches; gray (2.5Y 5/1) to grayish brown (2.5Y 5/2) silt loam; many medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; friable; occasional roots; few fine iron-manganese concretions; neutral.

The A horizon is very dark gray or black and is 10 to 16 inches thick. The B horizon is mottled. It ranges from dark gray to black in the upper part and from dark gray to light olive brown in the lower part. The C horizon is at a depth of 45 to 55 inches. It is neutral to moderately alkaline.

Sable soils formed in the same kind of material in which Virden and Herrick soils formed. Sable soils are poorly drained, whereas, Herrick soils are somewhat poorly drained. Sable soils have more clay in the A horizon and less clay in the B horizon than Virden soils.

68—Sable silty clay loam. This nearly level soil is in depressions in the prairie areas of the county. Individual areas are relatively large and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of soils that are similar to this Sable soil but have less clay and more lime throughout.

Seasonal wetness, clayey texture, and ponding are limitations to the use of this soil. Maintaining fertility and tilth is a major concern of management. A system of subsurface tile drains improves drainage where outlets are available. If drained, this soil is well suited to most crops grown in the county. Management group IIw-2; woodland group 2w.

Shiloh Series

This Shiloh series consists of nearly level, very poorly drained soils that formed in silty and clayey slack-water deposits under trees and grasses that thrive in wet conditions. These soils are mainly in depressions on low terraces along Silver Creek.

In a representative profile the surface layer is very dark gray and black silty clay loam to silty clay 14 inches thick. The subsoil is about 40 inches thick. The upper part of the subsoil is black to very dark gray silty clay that has olive and yellowish brown mottles, and the lower part is gray silty clay loam. The underlying material is gray to light gray silty clay loam that has olive mottles.

Organic-matter content is high. Permeability is slow to moderately slow, and available water capacity is high. Runoff is slow.

If drained, Shiloh soils are suited to crops grown in the county. Drained areas are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife, are suited to woodland wildlife, and are well suited to wetland wildlife. Few, if any, areas of these soils are in woodlands. Most areas are used for crops. Limitations for many nonfarm uses are severe.

Representative profile of Shiloh silty clay loam, in a cultivated area, 40 feet south and 510 feet west of the northeast corner of sec. 24, T. 1 S., R. 7 W.:

A11—0 to 5 inches; very dark gray (10YR 3/1) silty clay loam; brown (10YR 5/3) streaks; strong fine and very fine subangular blocky structure; friable to firm; continuous black (10YR 2/1) clay films on ped faces; slightly acid; clear smooth boundary.

A12—5 to 14 inches; black (10YR 2/1) silty clay; moderate medium prismatic structure parting to moderate to strong fine and medium subangular blocky; firm; thick continuous black (10YR 2/1) clay films on ped faces; common iron concretions; neutral; clear smooth boundary.

B1g—14 to 23 inches; black (10YR 2/1) silty clay; common fine faint olive (5Y 5/3) mottles and few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; thick continuous black (10YR 2/1) clay films on ped faces; few iron concretions; moderately alkaline; gradual smooth boundary.

B21g—23 to 33 inches; very dark gray (5Y 3/1) silty clay; weak to moderate prismatic structure parting to weak medium subangular blocky; firm; continuous very dark gray (2.5Y 3/1) clay films on vertical ped faces; moderately alkaline; gradual smooth boundary.

B22g—33 to 41 inches; dark gray (5Y 4/1) heavy silty clay loam; few medium faint olive (5Y 5/6) mottles; moderate medium prismatic structure parting to weak medium to coarse subangular blocky; firm; nearly continuous dark gray (N 4/0) clay films on ped faces; few iron concretions; moderately alkaline; gradual smooth boundary.

B3g—41 to 54 inches; gray (5Y 5/1) silty clay loam; common medium faint olive yellow (5Y 6/6) mottles; weak medium to coarse prismatic structure; firm to friable; continuous gray (5Y 5/1) clay films on ped faces; many iron concretions; some krotovinas; moderately alkaline; clear smooth boundary.

Cg—54 to 60 inches; gray to light gray (5Y 6/1) light silty clay loam; common medium faint olive (5Y 5/6) mottles; weak coarse prismatic structure; firm to friable; many iron concretions; some krotovinas; strong effervescence; moderately alkaline.

The A horizon is very dark gray or black and is 11 to 18 inches thick. The B horizon is mottled. It is very dark gray to black in the upper part and dark gray to gray in the lower part. It ranges from heavy silty clay loam to light clay and is neutral to moderately alkaline. The C horizon is at a depth of 36 to 60 inches. It is neutral to moderately alkaline.

Shiloh soils are in positions on the landscape similar to those of Okaw and Hurst soils. Shiloh soils are very poorly drained, whereas Hurst soils are somewhat poorly drained. Shiloh soils have a darker colored A horizon than Okaw soils.

138—Shiloh silty clay loam. This nearly level soil is mainly on terraces along Silver Creek, but in places it is in shallow depressions. Individual areas are relatively

small and are uniform in shape. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of soils that have light colored silty deposits less than 12 inches thick.

Slow to moderately slow permeability, high clay content, and seasonal wetness are limitations to the use of this soil. Controlling flooding and ponding and maintaining fertility and tilth are the main concerns of management. A system of subsurface tile drains and surface drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIw-2; woodland group 2w.

Sylvan Series

The Sylvan series consists of moderately steep to very steep, well drained soils that formed in thick silty material under a hardwood forest. These soils are on bluffs on uplands above the Mississippi River flood plain.

In a representative profile the surface layer is brown silt loam about 8 inches thick. The subsoil, about 25 inches thick, is brown silty clay loam in the upper part and silt loam in the lower part. The underlying material is yellowish brown silt loam.

Organic-matter content is low. Permeability is moderate, and available water capacity is high. Runoff is medium to rapid.

Sylvan soils are poorly suited to farming because of slope. They are well suited to open-land and woodland wildlife but are unsuited to wetland wildlife. Most areas of these soils are in woodland, but some rolling areas have been cleared of trees and are used for hay or pasture. Limitations for most nonfarm uses are severe because of slope.

Representative profile of Sylvan silt loam in a cultivated area, of Sylvan-Bold silt loams, 15 to 30 percent slopes, severely eroded, 2,640 feet south and 1,320 feet west of the northeast corner of sec. 5, T. 2 S., R. 8 W.:

Ap—0 to 8 inches; brown (7.5YR 4/4) silt loam; moderate medium platy structure parting to moderate fine angular blocky; friable; neutral; abrupt smooth boundary.

B21t—8 to 14 inches; brown (7.5YR 5/4) light silty clay loam; weak fine prismatic structure parting to fine subangular blocky; friable to firm; nearly continuous brown (7.5YR 4/4) clay or organic films on ped faces; strongly acid; clear smooth boundary.

B22t—14 to 22 inches; brown (7.5YR 5/4) silty clay loam; moderate to strong medium prismatic structure parting to moderate fine subangular blocky; friable to firm; continuous brown (7.5YR 4/4) clay or organic films on ped faces; few light yellowish brown (10YR 6/4) silt grains which disappear on wetting; strongly acid; clear smooth boundary.

B3—22 to 33 inches; brown (7.5YR 4/4) heavy silt loam; weak medium subangular blocky structure; friable; neutral; gradual smooth boundary.

C—33 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; very friable; strong effervescence; moderately alkaline.

The A horizon is dark grayish brown or very dark grayish brown in uneroded areas and brown in eroded areas. It is 8 to 14 inches thick. The B horizon is dark yellowish brown to brown heavy silt loam to silty clay loam. It is strongly acid to neutral. The C horizon is at a depth of 24 to 40 inches.

Sylvan soils formed in the same kind of material in which Fayette and Bold soils formed and are in similar positions on the landscape. Sylvan soils are not so deep to the calcareous C horizon as Fayette soils, but they are deeper than Bold soils. Sylvan soils have a calcareous C horizon, whereas the upper part of the C horizon in Fayette soils is leached of calcium. Sylvan soils have a well developed B horizon that Bold soils do not have.

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

962E3—Sylvan-Bold silt loams, 15 to 30 percent slopes, severely eroded. These moderately steep to steep soils are along watercourses and in highly dissected areas on bluffs.

This complex is about 60 percent Sylvan silt loam and 40 percent Bold silt loam. The Bold silt loam is calcareous and is on the lower part of the slope. The Sylvan silt loam is not calcareous in the surface layer and subsoil, has a thin, well developed subsoil, and is on the upper part of the slope. A Sylvan soil in an area of this complex has the profile described as representative of the series.

Included with these soils in mapping, in the southwest part of the county, are areas of soils in which the silty material on the lower part of the slope is not calcareous.

Runoff is rapid, and in cultivated areas the hazard of erosion is severe. Some idle areas are infested with Johnsongrass. Slope is a major limitation to the use of these soils. Controlling erosion and maintaining tilth and fertility are the main concerns of management. Many areas of these soils have been cleared and are used for wheat and hay. These soils are better suited to pasture or woodland than to most other uses (fig. 10). Management group VIe–1; woodland group 2r.

962G—Sylvan-Bold silt loams, 30 to 60 percent slopes. These very steep soils are along watercourses and in highly dissected areas on bluffs.

This complex is about 50 percent Sylvan silt loam and 50 percent Bold silt loam. The Bold silt loam is calcareous on the surface and is on the lower part of the slope. The Sylvan silt loam is not calcareous, has a thin, well developed subsoil, and is on the upper part of the slope. A Bold soil in an area of this complex has the profile described as representative of the series.

Included with these soils in mapping, in the southwest part of the county, are areas of soils in which the silty materials on the lower part of the slope is not calcareous.

Runoff is rapid. Slope is a major limitation to the use of these soils. Controlling erosion is a major concern of management. Most areas of these soils are in woodland. A few areas that had been cleared are now idle or have become naturally reforested. Management group VIIe–1; woodland group 2r.

U962F—Sylvan-Bold-Urban land complex, 25 to 60 percent slopes. This complex consists of steep and very steep Sylvan and Bold silt loams that have been partly disturbed by urban development. Most areas are on side slopes next to small bottom lands in the urbanized area of the county. Vegetation is lawn grasses, trees, and shrubs.

This complex is about 50 percent undisturbed Sylvan and Bold silt loams, 20 percent Urban land, and 30 percent areas that have been modified by covering Sylvan and Bold soils with fill or by grading. Most of the Urban land is covered by buildings and pavement. In modified areas, the fill material is silty and generally

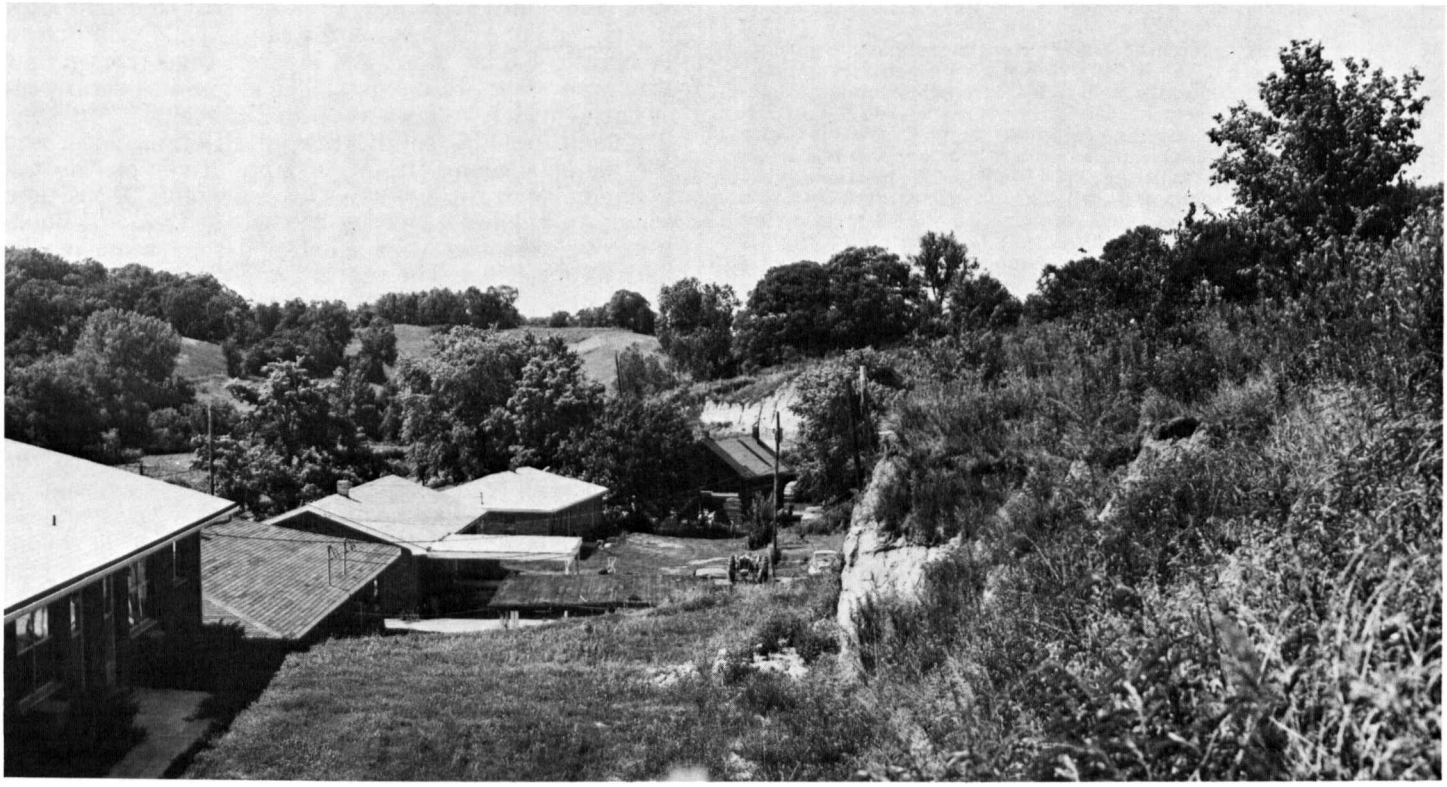


Figure 10.—**Urban expansion in an area of a Sylvan-Bold complex.**

comes from nearby areas of similar soils that have been removed by excavation or by grading.

Included with this complex in mapping are areas of the hilly Fayette-Urban land complex.

Slope is a severe limitation for many urban uses. During construction, these soils erode easily and produce large amounts of sediment. These soils are silty and have low strength when manipulated or saturated. Reestablishment of lawns, ornamental shrubs, and other vegetation requires special and unique management techniques. The suitability of disturbed areas for various uses must be determined at the individual site. Not assigned to a management group or a woodland group.

Tama Series

The Tama series consists of gently sloping to sloping, well drained soils that formed in silty deposits under prairie grasses. These soils are mainly on prominent ridges and knolls in the prairie regions of the county.

In a representative profile the surface layer is dark brown silt loam about 11 inches thick. The subsoil is mainly brown to dark brown silty clay loam about 38 inches thick. The underlying material is brown silt loam that has dark yellowish brown and light brownish gray mottles.

Organic-matter content is moderate. Permeability is moderate, and available water capacity is very high. Runoff is medium.

Tama soils are well suited to farming. They are well suited to open-land and woodland wildlife but are unsuited to wetland wildlife. These soils have no natural woodlands. Most areas have been used for crops, but recent urban development has taken much of the acreage from farming. Limitations for many nonfarm uses are slight.

Representative profile of Tama silt loam, 2 to 4 percent slopes, in a cultivated field, 63 feet south and 315 feet east of the center of sec. 16, T. 1 N., R. 7 W.:

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) when dry; moderate medium crumb structure; friable; many roots; slightly acid; clear smooth boundary.

A12—7 to 11 inches; dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure parting to moderate medium crumb; friable; many roots; slightly acid; clear smooth boundary.

B1—11 to 16 inches; brown to dark brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; continuous very dark grayish brown (10YR 3/2) clay films on ped faces; many roots; slightly acid; clear smooth boundary.

B21t—16 to 23 inches; brown to dark brown (7.5YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate to strong fine and medium subangular blocky; friable to firm; continuous very dark grayish brown (10YR 3/2) clay films on ped faces; many roots and pores; slightly acid; clear smooth boundary.

B22t—23 to 31 inches; brown to dark brown (7.5YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable to firm; nearly continuous dark brown to brown (7.5YR 3/2) clay films on ped faces; many roots and pores; few worm holes; medium acid; clear smooth boundary.

B23—31 to 40 inches; brown to dark brown (7.5YR 4/4) light silty clay loam; weak medium prismatic

structure parting to moderate coarse subangular blocky; friable; few light brownish gray (10YR 6/2) splotches; nearly continuous dark brown to brown (7.5YR 4/2) clay films on ped faces; many roots; slightly acid; clear smooth boundary.

B3—40 to 49 inches; brown to dark brown (10YR 4/3) silt loam; many fine distinct dark yellowish brown (10YR 3/4) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 3/2) clay films on ped faces; many pores; few fine roots; slightly acid; gradual smooth boundary.

C—49 to 63 inches; brown to dark brown (10YR 4/3) silt loam; many fine distinct dark yellowish brown (10YR 3/4) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak very coarse subangular blocky structure; friable; few dark brown (7.5YR 3/2) films on ped faces; many pores, few fine roots; slightly acid.

The A horizon ranges from very dark grayish brown to dark brown and is 8 to 14 inches thick. The lower part of the B horizon in some profiles is yellowish brown to dark yellowish brown. The B horizon is slightly acid to strongly acid. The C horizon is at a depth of 45 to 60 inches. It is medium acid to neutral.

Tama soils formed in the same kind of material in which Muscatine and Downs soils formed and are in similar positions on the landscape. Tama soils are well drained, whereas Muscatine soils are somewhat poorly drained. Tama soils lack the lighter colored A2 horizon that Downs soils have.

36B—Tama silt loam, 2 to 4 percent slopes. This gently sloping soil is mainly on ridgetops and knolls. It has the profile described as representative of the series.

Included with this soil in mapping are some small areas of soils where erosion has reduced the thickness of the surface layer to less than 7 inches and the surface layer is higher in clay than in the uneroded Tama soils. Also included are some small areas of somewhat poorly drained Muscatine soils and small areas of moderately sloping Tama soils.

Runoff is medium, and the hazard of erosion is slight. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to most crops grown in the county. Management group IIe–1; woodland group 1o.

36C2—Tama silt loam, 4 to 7 percent slopes, eroded. This sloping soil is mainly on the sides of ridges and knolls and in and around some watercourses. This soil has less than 7 inches of the original surface layer remaining. The surface layer is brown and has more clay than that of uneroded Tama soils.

Included with this soil in mapping are small areas of severely eroded soils that have less than 3 inches of the original surface remaining; these soils have more clay than uneroded Tama soils. Also included are small areas of Muscatine soils and areas of gently sloping Tama soils.

Erosion on this soil has caused a relative increase in clay content in the surface layer, has increased runoff, and has made tilth difficult to maintain. Controlling erosion and maintaining fertility and tilth are the main concerns of management. This soil is well suited to all crops grown in the county. Management group IIIe–1; woodland group 1o.

Udifluvents

407—Udifluvents, loamy. This soil consists of recently deposited sediment that varies widely in texture and is commonly stratified. It is neutral to calcareous. The surface layer is very dark gray to yellowish brown silty clay to coarse sand. All layers range from a few feet to many feet in thickness. The amount of stratification varies widely. Slopes are 0 to 2 percent.

This soil includes small areas of Riley, Landes, and Parkville soils along the Mississippi River on the unprotected side of the extensive levee system. Deposition, erosion, and channel cutting caused by frequent flooding are so extensive that a detailed separation of the soils is impractical. The texture and slope are variable because of the frequency and nature of flooding. Natural vegetation ranges from a recent growth of willows and other plants to stands of cottonwood, sycamore, and sweetgum. Some of the more sandy areas are barren.

Controlling flooding and the deposition of new material and preventing serious stream cutting are the main concerns of management. Most of the acreage of this soil is in woodland, but a few areas are used for corn or soybeans. Management group IVw–1; woodland group 1o.

Urban Land

533—Urban land. This land type consists of areas covered by buildings and pavement. Most of these areas are nearly level to gently sloping, but a few areas are moderately sloping in places. Urban land is mostly in the East St. Louis area.

Urban land is so altered by cuts and fills needed for urban works and structures that identification of the soils is not feasible. Paved areas and buildings make up more than 75 percent of the area. The paved areas are mostly parking lots that surround industrial plants, educational institutions, and shopping centers.

Runoff is generally very rapid. Paved areas are commonly designed to lead runoff into storm drainage systems. The increased runoff from paved areas aggravates flooding problems.

Only about 25 percent of the area supports vegetation, mostly grass borders and widely spaced trees and shrubs. Because runoff is so rapid, the water supply available to trees and shrubs is generally low. A few idle areas along edges of developed areas support various weeds and grasses. Not assigned to a management group or a woodland group.

Virden Series

The Virden series consists of nearly level, poorly drained soils that formed in silty deposits under prairie grasses. They are mainly in depressions in the prairie regions of the county.

In a representative profile the surface layer is very dark gray to black silt loam about 17 inches thick. The subsoil is 36 inches thick. The upper part of the subsoil is very dark gray and light brownish gray heavy silty clay loam that has yellowish brown mottles, and the lower part is light yellowish brown and grayish brown silt loam that has some yellowish brown strong brown, and pale olive mottles. The underlying material is light olive gray silt loam that has yellowish brown mottles.

Organic-matter content is high. Permeability is mod-

erately slow, and available water capacity is very high. Runoff is slow.

Virden soils are well suited to farming if they are adequately drained. Drained areas are well suited to open-land and woodland wildlife but are poorly suited to wetland wildlife. Undrained areas are poorly suited to open-land wildlife, are suited to woodland wildlife, and are well suited to wetland wildlife. These soils have no natural woodlands. Most areas are used for corn and soybeans. Limitations for many nonfarm uses are severe.

Representative profile of Virden silt loam, in a cultivated field, 1,380 feet south and 285 feet west of the northeast corner of sec. 36, T. 1 S., R. 8 W.:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam; moderate fine crumb structure; friable; medium acid; abrupt smooth boundary.

A12—9 to 12 inches; black (10YR 2/1) silt loam; few medium faint dark yellowish brown (10YR 3/4 and 4/4) mottles; moderate fine subangular blocky structure parting to moderate medium and fine crumb; friable; numerous worm casts; medium acid; clear smooth boundary.

A3—12 to 17 inches; black (10YR 2/1) silt loam; few fine faint dark brown (10YR 3/3) mottles and few fine distinct brown (10YR 5/3) and yellowish brown (10YR 5/6) mottles; moderate to strong fine subangular blocky structure parting to strong very fine subangular and angular blocky; friable; many pores; slightly acid; clear smooth boundary.

B21t—17 to 23 inches; very dark gray (10YR 3/1) heavy silty clay loam; few fine faint dark yellowish brown (10YR 3/4) mottles and few fine faint grayish brown (10YR 5/2) mottles; moderate fine prismatic structure parting to strong medium subangular blocky; firm; thick continuous black (10YR 2/1) clay films on ped faces; slightly acid; clear smooth boundary.

B22t—23 to 33 inches; light brownish gray (2.5Y 6/2) heavy silty clay loam; many fine prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; many roots and pores; thick continuous very dark gray (10YR 3/1) clay films on vertical ped faces; discontinuous on horizontal ped faces; slightly acid; gradual smooth boundary.

B31—33 to 45 inches; light yellowish brown (2.5Y 6/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles and few fine faint light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure parting to weak coarse subangular blocky; firm to friable; numerous roots; nearly continuous dark gray (10YR 4/1) clay films on vertical ped faces; common iron concretions; neutral; gradual smooth boundary.

B32—45 to 53 inches; grayish brown (2.5Y 5/2) silt loam; few medium prominent strong brown (7.5YR 5/6) mottles and many fine distinct pale olive (5Y 6/3) mottles; weak to moderate medium and coarse prismatic structure; friable; discontinuous grayish brown (10YR 5/2) clay films on vertical ped faces; mildly alkaline; gradual smooth boundary.

C—53 to 60 inches; light olive gray (5Y 6/2) silt loam; many coarse prominent yellowish brown (10YR 5/4 and 5/6) mottles; massive; friable; numerous relic roots; mildly alkaline.

The A horizon is very dark gray or black and is 11 to 14 inches thick. The B horizon has olive gray to light brownish gray mottles in the lower part. It is medium acid to mildly alkaline. The C horizon is at a depth of 45 to 60 inches. It ranges from neutral to moderately alkaline.

Virden soils formed in the same kind of material in which Sable and Herrick soils formed. Virden soils are poorly drained, whereas Herrick soils are somewhat poorly drained. Virden soils have less clay in the A horizon and more clay in the B horizon than Sable soils.

50—Virden silt loam. This nearly level soil is in depressions in the upland prairie areas of the county. In places the depressions are shallow. Individual areas are relatively small and are generally oval. Slopes are 0 to 1 percent.

Included with this soil in mapping are some small areas of soils that have more clay in the surface layer than the representative Virden soil and some small areas of soils that have strong brown mottles in the subsoil. Also included are areas where the subsoil formed in clayey, water-deposited sediment; in these areas the underlying material is stratified silty clay loam.

Moderately slow permeability and seasonal wetness are limitations to the use of this soil. Maintaining fertility and tilth is a major concern of management. The clayey subsoil and substratum may not affect farming uses, but they do affect nonfarm uses. A system of subsurface tile drains improves drainage where outlets are available. If drained, this soil is well suited to most crops grown in the county. Management group IIw–2; woodland group 2w.

Wakeland Series

The Wakeland series consists of nearly level, somewhat poorly drained soils that formed in silty alluvial sediment under a hardwood forest. They are mainly on bottom lands on the flood plains of the relatively narrow valleys.

In a representative profile the surface layer is dark grayish brown silt loam about 14 inches thick. It has brown and dark yellowish brown mottles in the lower part. The underlying material, to a depth of 47 inches, is mixed, dark grayish brown and brown stratified silt loam that has dark yellowish brown, brown, and dark grayish brown mottles. Below this, it is dark brown and dark gray silt loam that has yellowish red mottles.

Organic-matter content is low. Permeability is moderate, and available water capacity is high. Runoff is very slow. These soils have a seasonal high water table.

Wakeland soils are well suited to farming if excess water is removed. Drained areas are well suited to open-land wildlife, and undrained areas are suited to wetland wildlife. These soils are well suited to woodland wildlife in drained areas and are suited in undrained areas. They are well suited to woodland. Most areas have been cleared and partly drained and are used for cultivated crops. Limitations for many nonfarm uses are severe.

Representative profile of Wakeland silt loam, 700 feet north and 2,250 feet east of the southwest corner of sec. 14, T. 1 S., R. 8 W.:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak very thick platy structure parting to weak very fine granular; friable; many roots; medium acid; abrupt smooth boundary.

A12—8 to 14 inches; dark grayish brown (10YR 4/2) silt loam; common medium faint brown (10YR 5/3) mottles and few medium faint dark yellowish brown (10YR 4/4) mottles; moderate medium and thick platy structure parting to weak fine and very fine granular; friable; numerous black (10YR 2/1) specks; slightly acid; clear smooth boundary.

C1—14 to 28 inches; mixed dark grayish brown (10YR 4/2) and brown (10YR 5/3) stratified silt loam; few

fine faint dark yellowish brown (10YR 4/4) mottles; brown (10YR 5/3) and dark grayish brown (10YR 4/2) strata in lower part; weak fine granular structure; friable; numerous black (10YR 2/1) specks; slightly acid; clear smooth boundary.

C2—28 to 47 inches; stratified brown (10YR 5/3) and dark grayish brown (10YR 4/2) silt loam, silt, and fine sand; common medium distinct brown (7.5YR 4/4) mottles; weak fine granular structure and single grained; friable; slightly acid; abrupt smooth boundary.

IIAb—47 to 60 inches; mixed dark brown (7.5YR 3/2) and dark gray (2.5Y 4/1) silt loam; few medium prominent yellowish red (5YR 4/4) mottles; weak medium subangular blocky structure parting to weak fine and medium granular; friable; slightly acid.

The A horizon ranges from dark gray to dark grayish brown and is 8 to 14 inches thick. The C horizon is stratified. The strata are silt loam to fine sand and are ⅛ inch to 8 inches thick. The C horizon is medium acid to mildly alkaline.

Wakeland soils are in positions on the landscape similar to those of Dupo and Bonnie soils. Wakeland soils are unlike Dupo soils in that they have no buried black silty clay soil within a depth of 40 inches. Wakeland soils are somewhat poorly drained, whereas Bonnie soils are poorly drained.

333—Wakeland silt loam. This nearly level soil is on relatively narrow bottom lands that are associated with the uplands throughout the county. The areas in the border valleys are large and are uniform in shape, and the areas in the small valleys are small and are long and narrow. Slopes are 0 to 1 percent.

Included with this soil in mapping are small areas of soils that are more acid throughout than this Wakeland soil. Also included, along Silver creek, are areas of soils that have thin and medium strata of silty clay loam. In some places small areas of Dupo soils are also included.

A seasonal water table is a limitation to the use of this soil. Controlling flooding and maintaining fertility and tilth are the main concerns of management. A system of surface drains and subsurface tile drains improves drainage where outlets are available. If drained, this soil is suited to most crops grown in the county. Management group IIw–3; woodland group 2o.

Weir Series

The Weir series consists of nearly level, poorly drained soils that formed in loess under a hardwood forest. These soils are on uplands.

In a representative profile the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is grayish brown and light brownish gray silt loam about 10 inches thick. The subsoil is mainly light brownish gray and is about 50 inches thick. The upper part of the subsoil is mainly silty clay loam, and the lower part is silt loam. The underlying material is light brownish gray, yellowish brown, and brownish yellow silt loam.

Organic-matter content is low. Permeability is very slow, and available water capacity is high. Runoff is slow.

Weir soils are well suited to farming if excess water is removed. They are also well suited to open-land and woodland wildlife. These soils are generally fairly well suited to woodland. Most areas are used for cultivated crops, but a few areas are in woodland. Limitations for many nonfarm uses are severe.

Representative profile of Weir silt loam, in a cultivated field, 10 feet south and 10 feet east of the northwest corner of sec. 34, T. 2 N., R. 7 W.:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light gray (2.5Y 7/2) when dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A21—7 to 11 inches; grayish brown (10YR 5/2) silt loam; moderate medium platy structure parting to weak to moderate fine granular; friable; neutral; gradual smooth boundary.

A22—11 to 17 inches; light brownish gray (2.5Y 6/2) silt loam; common medium faint gray to light gray (10YR 6/1) mottles and few fine distinct brown to dark brown (10YR 4/3) mottles; moderate thick platy structure parting to weak medium subangular blocky; very friable; many small iron concretions; neutral; abrupt smooth boundary.

B21t—17 to 23 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct olive yellow (2.5Y 6/6) mottles; weak fine prismatic structure parting to strong fine subangular blocky and angular blocky; firm; few light gray to gray (10YR 6/1) silt grains, continuous grayish brown (2.5Y 5/2) clay films on ped faces; many fine very dark brown (10YR 2/2) iron concretions; strongly acid; clear smooth boundary.

B22t—23 to 32 inches; light brownish gray (2.5Y 6/2) light silty clay; common medium distinct brownish yellow (10YR 6/6) mottles; moderate fine to medium prismatic structure parting to moderate medium subangular blocky; firm; thin continuous grayish brown (2.5Y 5/2) clay films on ped faces; many fine very dark brown (10YR 2/2) iron concretions; very strongly acid; gradual smooth boundary.

B23t—32 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium to coarse distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles and few medium prominent dark brown to brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; discontinuous grayish brown (2.5Y 5/2) clay films on ped faces; many fine very dark brown (10YR 2/2) iron concretions; strongly acid; gradual smooth boundary.

B3—42 to 67 inches; light brownish gray (2.5Y 6/2) heavy silt loam; many medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; weak coarse prismatic structure parting to massive; firm to friable; patchy grayish brown (2.5Y 5/2) clay films on ped faces; many fine very dark gray (10YR 3/1) and dark gray (10YR 4/1) root channels; medium acid; gradual smooth boundary.

C—67 to 87 inches; mixed light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) silt loam; massive; friable; large iron concretions; very dark gray (10YR 3/1) and dark gray (10YR 4/1) root channels; slightly acid.

The Ap horizon ranges from dark grayish brown to grayish brown. The A2 horizon ranges from light brownish gray to gray. The B horizon is light brownish gray to grayish brown heavy silt loam to light silty clay. It is medium acid to very strongly acid. The C horizon is at a depth of 40 to 60 inches or more. It is medium acid to moderately alkaline.

Weir soils are in positions on the landscape similar to those of Iva soils. Weir soils are poorly drained, whereas Iva soils are somewhat poorly drained.

165—Weir silt loam. This nearly level soil is on uplands. Slopes are 0 to 2 percent. Individual areas are small to moderately large and are uniform in shape.

Included with this soil in mapping are some areas of soils that have more yellow and brown in the subsoil. Also included are areas of soils that have water-deposited clayey underlying material.

Very slow permeability and seasonal wetness are limitations to the use of this soil. Maintaining fertility

and tilth is a major concern of management. A system of surface drains improves drainage where outlets are available. This soil is suited to most crops grown in the county. Management group IIIw–3; woodland group 4w.

Worthen Series

The Worthen series consists of nearly level to strongly sloping, well drained and moderately well drained soils that formed mainly in water-deposited silty sediment under prairie grasses. These soils are mainly on foot slopes along bluffs in the Mississippi River valley.

In a representative profile the surface layer is very dark grayish brown and very dark brown silt loam about 21 inches thick. The subsoil is about 35 inches thick. It is very dark grayish brown silt loam in the upper part and dark yellowish brown and dark brown silt loam in the lower part. The underlying material is dark brown or brown silt loam that has yellowish brown mottles.

Organic-matter content is high. Permeability is moderate, and available water capacity is very high. Runoff is medium.

Worthen soils are well suited to farming. They are also well suited to open-land wildlife. Most areas of these soils are used for truck crops. Some areas are being converted to nonfarm uses.

Representative profile of Worthen silt loam, 1 to 4 percent slopes, in a cultivated field, 450 feet west and 1,450 feet north of the southeast corner of sec. 6, T. 2 N., R. 8 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) when dry; moderate fine crumb structure; friable; neutral; clear smooth boundary.

A12—8 to 14 inches; very dark brown (10YR 2/2) silt loam; moderate fine and medium granular structure; friable; neutral; gradual smooth boundary.

A3—14 to 21 inches; very dark grayish brown (10YR 3/2) silt loam; moderate very fine subangular blocky structure parting to moderate medium granular; friable; slightly acid; gradual smooth boundary.

B2—21 to 32 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium subangular blocky structure; friable; slightly acid; gradual smooth boundary.

B31—32 to 47 inches; dark yellowish brown (10YR 3/4) silt loam; weak medium prismatic structure parting to weak coarse subangular blocky; friable; discontinuous very dark brown (10YR 2/2) organic coats on peds; slightly acid; gradual smooth boundary.

B32—47 to 56 inches; dark brown (10YR 4/3) silt loam; weak medium prismatic structure; friable; slightly acid; gradual smooth boundary.

C—56 to 60 inches; dark brown (10YR 4/3) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; light brownish gray (10YR 6/2) streaks which disappear on wetting; slightly acid.

The B horizon is dark yellowish brown to very dark grayish brown silt loam to heavy silt loam. It is medium acid to slightly acid. The C horizon is at a depth of 36 to 60 inches. It is slightly acid to mildly alkaline.

Worthen soils are in positions on the landscape similar to those of Littleton soils. Worthen soils are well drained and moderately well drained, whereas Littleton soils are somewhat poorly drained.

37B—Worthen silt loam, 1 to 4 percent slopes. This nearly level to gently sloping soil is in areas along the lower slopes of the bluffs. Individual areas are small to moderately large.

Included with this soil in mapping are some areas of soils that have some grayish mottles within a depth of 30 inches and some areas of soils that have a dark brown surface layer. Also included are areas of soils that are high in lime (calcareous), which are shown by a spot symbol on the soil map.

Controlling runoff from adjacent uplands, controlling erosion, and maintaining fertility and tilth are the main concerns of management. This soil is suited to most crops grown in the county. Management group IIe–1; woodland group 1o.

Use and Management of the Soils

The soil survey is a detailed analysis and evaluation of the most basic resource of the survey area–the soil. It may be used to fit the use of the land, including urbanization, to the limitations and potentials of the natural resources and the environment and to help avoid soil-related failures in uses of the land.

During a soil survey soil scientists, conservationists, engineers, and others keep extensive notes, not only about the nature of the soils but also about unique aspects of behavior of these soils in the field and at construction sites. These notes include observations of erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors relating the kinds of soil and their productivity, potentials, and limitations under various uses and management. In this way field experience, incorporated with measured data on soil properties and performance, is used as a basis for predicting soil behavior.

Information in this section will be useful in applying basic facts about the soils to plans and decisions for use and management of soils for crops and pasture, range, woodland, and many nonfarm uses, including building sites, highways and other transportation systems, sanitary facilities, parks and other recreational developments, and wildlife habitat. From the data presented, the potential of each soil for specified land uses may be determined; soil limitations to these land uses may be identified; and costly failures in homes and other structures, because of unfavorable soil properties, may be avoided. A site can be selected where the soil properties are favorable, or practices can be planned that will overcome the soil limitations.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning areas and on the environment. Both productivity and environment are closely related to the nature of the soil. Plans can be made to maintain or create a land use pattern in harmony with the natural soil.

Contractors can find information useful in locating sources of sand and gravel, road fill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists can find useful information in this soil survey. The safe disposal of wastes, for exam-

ple, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, trees and shrubs, and most other uses of land are influenced by the nature of the soil.

Crops

About 73 percent of St. Clair County is cultivated. Soybeans is the principal crop. Corn and wheat are other important crops.

The main considerations in managing cultivated soils in the county are controlling erosion, conserving moisture, and maintaining fertility.

Management practices that help to control erosion and conserve moisture are farming on the contour; the uses of terraces, diversions, waterways, conservation cropping systems, and conservation tillage; timeliness of all field operations; and the use of crop residue. Generally, a combination of several practices is used.

Management practices that help to maintain fertility are the application of adequate amounts of chemical fertilizer, green manure, and barnyard manure and the inclusion of cover crops, grasses, and legumes in the conservation cropping system. Controlling erosion also helps to maintain fertility.

Drainage is needed in some areas to offset the effects of unfavorable soil characteristics.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the 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 slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering.

In the capability system used in this soil survey, all soils are grouped at three levels, the capability class, the subclass, and the management group (*11*). These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

Class IV soils have very severe limitations that reduce the choice of plants or require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife habitat. (No class V soils are in St. Clair County).

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes. (No class VIII soils are in St. Clair County.)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage) ; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in St. Clair County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture or range, woodland, wildlife habitat, or recreation.

MANAGEMENT GROUPS are soil groups within the subclasses. The soils in one management group are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the management group is a convenient grouping for making many statements about management of soils. Management groups are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass or kind of limitation as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the management group within each subclass.

Management groups

In the following pages the management groups in St. Clair County are described and suggestions for the use and management of the soils are given. Soils used for cultivated crops generally need lime and fertilizers. The amounts to apply on a given soil should be deter-

mined by soil tests. To find the names of all the soils in any given management group, refer to the "Guide to Mapping Units" at the back of this survey.

MANAGEMENT GROUP I–1

This group consists of deep, nearly level, somewhat poorly drained soils on uplands and terraces. The surface layer is silt loam. The subsoil is mainly silty clay loam, but in some areas it is silt loam.

Organic-matter content (*1, 8*) is mainly moderate to high. Natural fertility is high. Available water capacity is high to very high, and permeability is moderately slow to moderate. Limitations are few. Some areas have a seasonal high water table and require some drainage. The major management practices required are those that maintain organic-matter content and fertility and improve and maintain tilth.

Careful management of crop residue and use of green-manure crops help to improve and maintain organic-matter content, fertility, and tilth. Drainage in places by random tile lines or by surface drainage helps to lower the seasonal high water table.

The soils in this group are well suited to corn, soybeans, and small grain.

MANAGEMENT GROUP I–2

Only Haymond silt loam is in this group. It is a deep, nearly level, mostly well drained soil on bottom lands adjacent to the Mississippi and Kaskaskia Rivers. All soil layers are silt loam.

Organic-matter content is mainly low. Natural fertility is high. Available water capacity is very high, and permeability is moderate. Occasional flooding is a limitation. The major management practices required are those that maintain organic-matter content, improve fertility, and improve and maintain tilth.

Careful management of crop residue and use of green-manure crops help to improve and maintain organic-matter content, fertility, and tilth.

This soil is well suited to corn, soybeans, and small grain. Flooding normally occurs early in spring and has very little influence on summer crops.

MANAGEMENT GROUP IIe–1

This group consists of deep, gently sloping, well drained and somewhat poorly drained soils on uplands and high terraces. The surface layer is mainly silt loam. The subsoil is mainly silty clay loam, but it is silt loam in a few areas.

Organic-matter content is mainly low to moderate. Natural fertility is high. Available water capacity is high to very high. Permeability is mainly moderate, but in some areas it is slow. Because of slope, erosion is the major concern. Some areas have a seasonal high water table that restricts use during some period of the year.

Such conservation tillage practices as the use of clover or other legumes in the cropping system or the use of a chisel plow help to control erosion. Careful management of crop residue and use of green-manure crops help to improve and maintain organic-matter content, fertility, and tilth.

The soils in this group are well suited to all crops grown in the county.

MANAGEMENT GROUP IIe–2

This group consists of deep, gently sloping and sloping, somewhat poorly drained and well drained, eroded soils on uplands. The surface layer is silt loam. The subsoil is silty clay loam. In some eroded areas plowing has mixed material from the subsoil with the surface layer, and in these areas the plow layer has more clay.

Organic-matter content is low. Natural fertility is moderate to high. Available water capacity is mainly high, and permeability is moderate to slow. In some eroded areas that have low organic-matter content, thick crusts form after hard rains. Erosion and poor tilth are the major concerns.

Such conservation tillage practices as contouring, terracing, and using legumes in the cropping system help to control erosion. Minimum tillage and careful management of crop residue help to improve and maintain organic-matter content, fertility, and tilth. Careful management of crop residue and the use of legumes in the cropping system help to reduce crust formation.

The soils in this group are well suited to all crops grown in the county. A seedbed is difficult to prepare because of the high clay content.

MANAGEMENT GROUP IIe–3

This group consists of deep, gently sloping, well drained soils on terraces. The surface layer is fine sandy loam and loam. The subsoil is fine sandy loam and silty clay loam. The underlying material is stratified sand and silt.

Organic-matter content is moderate and low. Natural fertility is medium to high. Available water capacity is moderate, and permeability is moderate and moderately rapid. Erosion is the major concern. Some nearly level areas are somewhat droughty. Occasional flooding is a limitation in unprotected areas.

Such conservation measures as using grasses and legumes in the cropping system, incorporating organic matter into the soil, and using conservation tillage help to control erosion. Terracing or contouring is somewhat difficult because of the short slopes and the very irregular pattern of the soils. Minimum tillage and careful management of crop residue are needed.

The soils in this group are suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIw–2

This group consists of deep, nearly level and depressional, poorly drained, very poorly drained, and somewhat poorly drained soils on uplands and terraces. The surface layer is mainly silt loam. The subsoil is mainly silty clay loam. In some areas the surface layer and subsoil are silty clay loam, and in other areas the subsoil is silty clay.

Organic-matter content is low to high. Natural fertility is high. Available water capacity is high and very high, and permeability is moderate to slow. Ponding in spring and the seasonal high water table are the major concerns of management. An additional concern is the poor tilth of the surface layer in a few areas.

Drainage is needed to reduce ponding and lower the seasonal high water table. Random surface drains or a system of subsurface drains can be used if outlets are available. Minimum tillage and careful management of

crop residue help to control erosion during periods of intense rainfall and help to improve and maintain organic-matter content, fertility, and tilth (fig. 11). The use of legumes in the cropping system improves water intake rate and tilth.

The soils in this group are suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIw–3

This group consists of deep, nearly level, poorly drained and somewhat poorly drained soils on bottom lands adjacent to the Mississippi and Kaskaskia Rivers. The surface layer and underlying material are mainly silt loam and silty clay loam. In some places the surface layer is clayey, and in some areas loamy underlying material is within a depth of 5 feet.

Organic-matter content is low to high. Available water capacity is moderate to high, and permeability is moderate to slow. Flooding is the main concern. Excess water on and in the soil is also a concern.

Surface drains or subsurface tile drains help to remove excess water. Minimum tillage and careful management of crop residue help to maintain organic-matter content and tilth and to control erosion during periods of flooding.

If protected from flooding, the soils in the group are well suited to all crops grown in the county.

MANAGEMENT GROUP IIIe–1

This group consists of deep, sloping, moderately well drained and well drained soils on uplands. The surface layer is silt loam. The subsoil is mainly silty clay loam, but in a few areas it is silt loam. In some eroded areas the surface layer is mixed with material from the subsoil, and in these places the surface layer has more clay.

Organic-matter content is mainly low to moderate, but in some places it is high. Available water capacity is high to very high, and permeability is mainly moderate. Erosion is the major concern of management. Erosion after hard rains results in crusting of the surface and in low organic-matter content of the surface layer.

Such conservation measures as the use of grasses and legumes in the cropping system, conservation tillage, terracing, contouring, and careful management of crop residue help to control erosion. In the areas where sinkholes are common, more grasses and legumes are needed in the cropping system to help control erosion because terraces are not practical to install. Minimum tillage and careful management of crop residue also help to improve and maintain organic-matter content, fertility, and tilth.

The soils in this group are suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIIe–2

This group consists of deep, gently sloping and sloping, well drained, severely eroded soils on uplands. The surface layer is silty clay loam. Because of erosion, less than 3 inches of the original silt loam surface layer remains. In plowed areas, the surface layer is mixed with silty clay loam from the upper part of the subsoil, and because of this the plow layer has more clay.

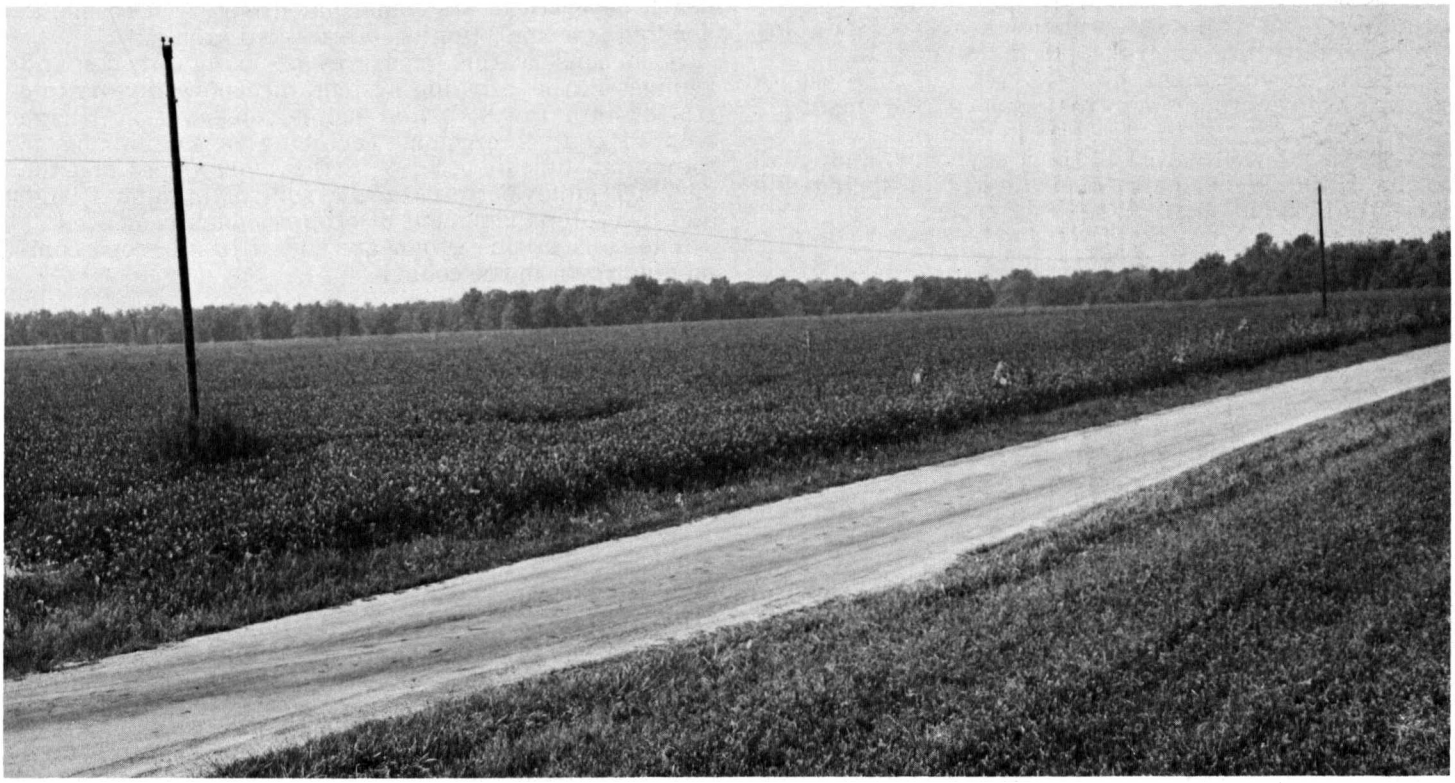


Figure 11.—**Area of an Iva silt loam in soybeans and clover.**

Organic-matter content is mainly low. Response of plants to fertilizer is moderate. Available water capacity is high, and permeability is moderate. Erosion is the major concern of management. Poor tilth in the surface layer is also a concern.

Such conservation measures and tillage practices as terracing, contouring, and the use of grasses and legumes in the cropping system help to improve and maintain organic-matter content, fertility, and tilth and help to control erosion. Minimum tillage and careful management of crop residue help to improve tilth.

The soils in this group are suited to all crops commonly grown in the county. A seedbed is difficult to prepare because of the high clay content.

MANAGEMENT GROUP IIIe–3

This group consists of deep, gently sloping to sloping, somewhat poorly drained Hurst soils on terraces along the Kaskaskia River. The surface layer is silt loam. The subsoil is silty clay. In some places a sandy substratum is within a depth of 40 inches. Because of erosion, the present surface layer has more clay than the original.

Organic-matter content is low. Response of plants to fertilizer is low. Available water capacity is moderate and permeability is very slow. Erosion is the major concern of management. Occasional flooding is also a concern.

Such conservation measures as the use of grasses and legumes in rotation and incorporation of organic material into the surface layer help to control erosion. Terracing and contouring are difficult because of the short slopes and the very irregular pattern of the soils, but where applicable, these practices help to control erosion. Minimum tillage and careful management of crop residue help to control erosion and improve and maintain organic-matter content, fertility, and tilth.

The soils in this group are suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIIe–4

Only Orthents, silty, 3 to 10 percent slopes, are in this group. The soils are somewhat poorly drained to moderately well drained. The soil material has been manipulated by earth-moving equipment to restore surface mined land to approximately original land configurations and to construct grade separations, ramps, and rights-of-way in the interstate road system. The surface layer and underlying material are mainly silt loam to silty clay loam, but texture varies somewhat.

Available water capacity is high. Permeability is estimated to be moderately slow. Reaction is medium acid to neutral. Erosion and lack of tilth are the major concerns of management.

Such conservation measures as the use of grasses and legumes following reclamation, conservation tillage for grain crops, and careful management of all crop residue help to improve tilth. Conservation tillage, the use of grasses and legumes in the cropping system, contouring, and terracing help to control erosion.

The soils in this group are suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIIs–1

Only Landes fine sandy loam, 1 to 6 percent slopes, is in this group. It is a deep, gently sloping and sloping, moderately well drained and well drained soil on terraces. The subsoil is fine sandy loam and loamy fine sand.

Organic-matter content is moderate. Response of plants to fertilizer is moderate. Available water capacity is moderate, and permeability is moderately rapid to rapid. Susceptibility to drought is the major concern of management.

Minimum tillage and careful management of crop residue help to reduce droughtiness. The incorporation of crop residue into the soil helps to increase the available water capacity. These conservation measures also improve and maintain organic-matter content, fertility, and tilth.

This soil is well suited to all crops commonly grown in the county.

MANAGEMENT GROUP IIIs–2

Only Darmstadt silt loam, 0 to 2 percent slopes, is in this group. It is a somewhat poorly drained soil on uplands and outwash plains. The subsoil is silty clay loam and has a layer that is high in sodium salts.

Organic-matter content is moderate. Available water capacity is low, and permeability is slow to very slow. The slow to very slow permeability and high sodium content in the subsoil are the major concerns of management.

Although the response of plants to fertilizer is not high, a complete fertilization program should be used to improve crop production. Because of the high pH resulting from excess sodium, acid phosphate fertilizers give better response than rock phosphate. Minimum tillage, the use of grasses and legumes in the cropping system, and careful management of crop residue help to increase available water capacity and thus reduce droughtiness. These conservation measures and tillage practices also help to improve and maintain organic-matter content, fertility, and tilth.

This soil is suited to all crops commonly grown in the county. Because of the lack of water, this soil is better suited to small grain than to corn or soybeans.

MANAGEMENT GROUP IIIs–3

Only Darmstadt silt loam, 2 to 4 percent slopes, eroded, is in this group. It is a somewhat poorly drained soil on uplands and outwash plains. The surface layer is less than 7 inches thick because of erosion. The subsoil is silty clay loam that is exposed in many places. There is a layer within the soil that has a high sodium content. The exposed areas of high sodium content are known locally as scalds, buffalo wallows, scabby areas, or slickspots.

Organic-matter content was originally moderate, but it is presently low because of erosion. Response of plants to fertilizer is low. Available water capacity is low, and permeability is very slow to slow. The high sodium content, low available water capacity, and erosion (fig. 12) are the major concerns of management.

Because of the high sodium content in this soil, acid phosphate fertilizers give better response than rock phosphate. The value of terracing and contouring is somewhat questionable because of the short slopes, the very irregular pattern of the soils, the slow to very slow permeability, and the exposure of soil that is diffi-

Figure 12.—No-tillage on a sloping Darmstadt silt loam reduces soil losses.

cult to vegetate. The use of grasses and legumes in a long cropping system helps to reduce the sodium content, to increase the available water capacity, and to control erosion. Minimum tillage helps to minimize crust formation. These conservation measures and tillage practices help to improve and maintain organic-matter content, fertility, and tilth.

This soil is suited to all crops commonly grown in the county. It is better suited to wheat than to most other crops.

MANAGEMENT GROUP IIIw-2

This group consists of deep, nearly level, poorly drained and somewhat poorly drained soils on uplands and outwash plains. The surface layer is silt loam. The subsoil is silty clay loam. Some areas of these soils have a high sodium content, and in some of these areas a sodium-saturated condition is exposed at the surface. The exposed areas are small and are commonly referred to as scalds, scabby spots, buffalo wallows, and slickspots. Some areas do not have a high sodium content.

Organic-matter content is mainly moderate to moderately low. Response of plants to fertilizer is low. Available water capacity is mainly low, and permeability is very slow to slow. Some areas have high available water capacity and moderately slow permeability. The areas that have a high sodium content are somewhat droughty in summer because of low available water capacity. Excess water on the surface, a seasonal high water table, and high sodium content are the major concerns of management.

Because of the high sodium content in areas of these soils, acid phosphate fertilizers give better response than rock phosphate. The use of grasses and legumes in the cropping system, surface drainage, and conservation tillage help to lower the seasonal high water table, to lower sodium content, and to remove excess water on the surface. Minimum tillage and careful management of crop residue help to control erosion during periods of intense rainfall. These conservation measures and tillage practices help to improve and maintain organic-matter content, fertility, and tilth.

The soils in this group are suited to all crops commonly grown in the county. They are better suited to wheat than to corn and soybeans. Low available water capacity can reduce the yield of corn and soybeans.

MANAGEMENT GROUP IIIw-3

This group consists of deep, nearly level, poorly drained and somewhat poorly drained soils on uplands and on low terraces that are mainly on the Kaskaskia River. The surface layer is silt loam. The subsoil is silty clay loam and silty clay.

Organic-matter content is low. Response of plants to fertilizer is mainly low, but some areas on high terraces give better response to fertilizer. Available water capacity is moderate to high, and permeability is very slow. Excess water on the surface, flooding, and very slow permeability in the subsoil are the major concerns of management.

Open drains help to remove excess water on the surface and control flooding. A complete fertilization program and the use of grasses and legumes in the cropping system help to increase available water capacity at a greater depth. Minimum tillage and careful management of crop residue help to improve and maintain permeability, organic-matter content, fertility, and tilth.

The soils in this group are suited to all crops com-

monly grown in the county. Flooding restricts the choice of crops to such annuals as corn and soybeans. Yields on some of these soils are reduced because of moderate available water capacity during droughty periods, mainly in summer.

MANAGEMENT GROUP IIIw–4

Only Bonnie silt loam is in this group. It consists of a deep, nearly level, poorly drained soil on bottom lands. The underlying material is silt loam.

Organic-matter content is moderately low. Response of plants to fertilizer is moderate. Available water capacity is high, and permeability is slow. Flooding and slow permeability are the major concerns of management.

Surface drainage helps to remove excess water on the surface. A complete fertilization program and careful management of crop residue help to improve tilth and increase water intake rate. Minimum tillage and careful management of crop residue help to control erosion. These conservation measures and tillage and drainage practices also help to improve and maintain organic-matter content, fertility, and tilth.

This soil is suited to all crops commonly grown in the county, but flooding restricts the choice of crops that can be grown.

MANAGEMENT GROUP IIIw–5

This group consists of deep, nearly level, poorly drained soils on bottom lands. The surface layer and subsoil are silty clay. Some areas are underlain by loamy material within a depth of 60 inches.

Organic-matter content ranges from moderate to high. Response of plants to fertilizer is moderate. Available water capacity is moderate, and permeability is slow to very slow. Susceptibility to frequent flooding, the fine texture of the surface layer, and slow to very slow permeability are the major concerns of management.

Many areas of these soils are protected from flooding by the extensive levee system along the Mississippi River bottom, but surface drainage also helps to overcome internal ponding and very slow permeability and to remove excess water from the surface. Minimum tillage and careful management of crop residue help to reduce erosion during periods of intense rainfall. Surface drainage, minimum tillage, and careful management of crop residue help to reduce erosion during periods of intense rainfall. Surface drainage, minimum tillage, and careful management of crop residue, also help to improve and maintain organic-matter content, fertility, and tilth.

The soils in this group are suited to all crops grown in the county, but flooding generally restricts the choice of crops to summer crops. Because of the fine textured surface layer, seedbeds are difficult to prepare. Fall plowing is suitable.

MANAGEMENT GROUP IVe–1

This group consists mainly of deep, sloping, well drained, severely eroded soils on uplands, but it also consists of strongly sloping soils that have sinkholes. The surface layer and subsoil are silty clay loam.

Organic-matter content is low. Response of plants to fertilizer is moderate. Available water capacity is high, and permeability is moderate. Erosion is the major concern of management. Poor tilth of the present surface layer is also a concern.

Such conservation practices as terracing, contouring, conservation tillage, and using grasses and legumes in the cropping system help to control erosion. In areas that have sinkholes, terracing is impractical, and more use of grasses and legumes in the cropping system is required to help control erosion. Minimum tillage and careful management of crop residue are needed on all soils. These conservation measures and tillage practices help to improve and maintain organic-matter content, fertility and tilth and help to control erosion.

The soils in this group are suited to crops commonly grown in the county. Because of slope and the susceptibility to erosion, these soils are better suited to hay and pasture than to most other crops. A seedbed is difficult to prepare because of erosion.

MANAGEMENT GROUP IVe–2

This group consists of deep, sloping and strongly sloping, well drained and somewhat poorly drained, eroded soils on uplands and terraces. The surface layer is silt loam less than 7 inches thick. The subsoil is silty clay loam. In some places the silty clay loam subsoil has been mixed with the surface layer, and in these places the plow layer has more clay.

Organic-matter content is low. Response of plants to fertilizer is moderate to low. Available water capacity is moderate to high and permeability is moderate to very slow. Because of slope, erosion is the major concern of management. Poor tilth of the present surface layer is also a concern. Surface crusting results from erosion and the low organic-matter content of the surface layer.

If the soils in this group are used for row crops, such intensive conservation measures as conservation tillage, terracing, and contouring are needed. Minimum tillage and careful management of crop residue help to improve tilth. These conservation measures and tillage practices help to improve and maintain organic-matter content, fertility, and tilth and to reduce soil and water losses.

These soils are suited to some of the crops commonly grown in the county. Because of slope and susceptibility to erosion, these soils are better suited to hay and pasture than to such row crops as corn and soybeans. Surface crusting can reduce the emergence of corn or soybeans.

MANAGEMENT GROUP IVe–3

Only Darmstadt silty clay loam, 4 to 10 percent slopes, severely eroded, is in this group. It is a deep, somewhat poorly drained soil on uplands and outwash plains. Most of the original silt loam surface layer has been lost through erosion, and the present plow layer is a mixture of a part of the original surface layer and material from the upper part of the subsoil.

Organic-matter content is low. Response of plants to fertilizer is low. Available water capacity is low, and permeability is very slow to slow. Erosion, slope, the high sodium content of layers within the soil, and drought are the major concerns of management. Poor tilth of the present surface layer is also a concern.

This soil is better suited to pasture and hay than to most other crops. In places the high sodium content makes it difficult to establish vegetation. Because of the high clay content and low organic-matter content, a seedbed is difficult to prepare.

MANAGEMENT GROUP IVw–1

Only Udifluvents, loamy (0 to 2 percent slopes) is in this group. The soils consist of deep, variable fine sands to silty clays that are not protected by levees and thus are subject to frequent damaging floods. The soil material is neutral to moderately alkaline.

Frequent flooding causes deposition, scouring, and channel cutting. Good yields of late-planted crops, including corn and soybeans, can be obtained, but the risk of crop loss by flooding is high. The areas are not well suited to such overwintering crops as wheat and hay. Plowing, planting, and harvesting must be done when conditions permit. Many areas of these soils have been left in natural woodland.

MANAGEMENT GROUP VIe–1

This group consists of deep, strong sloping to steep, well drained soils on uplands. The surface layer is silt loam. The subsoil is mostly silty clay loam. Most areas in these soils are eroded, but there are some wooded uneroded areas.

Organic-matter content is mostly low. Response of plants to fertilizer is moderate. Available water capacity is high, and permeability is moderate. If the soils in this group are used for row crops, the hazard of erosion is severe and soil losses are very high. Because of slope, erosion is the major concern of management.

Using permanent pasture, reforesting, or preserving native timber helps to control erosion.

These soils are suited to pasture or woodland.

MANAGEMENT GROUP VIe–2

Only Alford-Hurst silty clay loams, 7 to 15 percent slopes, severely eroded, are in this group. These soils are on terraces. The subsoil is silty clay loam. Seeps are common.

Organic-matter content is low. Response of plants to fertilizer is moderate to low. Available water capacity is moderate to high, and permeability is moderate to very slow. Slope and the present eroded condition are the major concerns of management.

The use of vigorous pasture plants helps to control erosion. Fertilizer application and controlled grazing help to establish and maintain grasslands. Minimum tillage is needed to renovate pasture.

These soils are well suited to pasture.

MANAGEMENT GROUP VIs–1

Only Orthents, loamy, are in this group. These soils consist of loamy material spoiled during construction of the Kaskaskia River navigation canal. They are gently sloping to moderately steep and moderately well drained to well drained. Areas are rectangular. The surface layer and underlying material are somewhat variable, but they are mainly sandy loam to very fine sandy loam.

Available water capacity is low. Permeability is estimated to be rapid. Reaction is neutral to moderately alkaline. Erosion on the steep slopes, soil blowing on the gently sloping tops, and droughtiness are the main concerns of management.

Permanent plant cover is needed to control erosion.

Because of erosion, soil blowing, and low available water capacity, the soils in this group are better suited to woodland or pasture than to most other uses.

MANAGEMENT GROUP VIIe–1

This group consists of deep, very steep, well drained soils on uplands. The surface layer is silt loam. The subsoil is mostly silty clay loam.

Organic-matter content is mainly low, but in places it is moderately low to moderate. Response of plants to fertilizer is low to moderate. Available water capacity is high, and permeability is moderate. Because of slope, erosion is the major concern of management if permanent plant cover is removed.

Permanent plant cover is needed to control erosion.

The soils in this group are suited to woodland. If very careful management is used, they have limited use as pasture.

MANAGEMENT GROUP VIIe–2

Only Orthents, silty, 30 to 60 percent slopes, are in this group. These soils are somewhat poorly drained to well drained. They consist of land that has been stripped for coal. In some places the ridgetops have been leveled to a width of about 20 feet. The slopes in many places are so steep that mass movement of soil downslope has occurred. The surface layer and underlying material are variable, but are mainly silt loam to light silty clay loam. Large rocks are common on the mid and lower slopes.

Runoff is rapid. Available water capacity is high. Permeability is estimated to be moderately slow or moderate. Reaction is medium acid to neutral. Slope, mass movement of soil downward, and erosion are the major concerns of management.

A high level of management is normally not used on these soils. Revegetation requires special management techniques.

Because of slope, and erosion, the soils in this group are better suited to woodland, pasture, or recreational uses than to most other uses.

Predicted yields

The average yields per acre that can be expected of the principal crops grown under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in table 4 because of seasonal variations in rainfall and other climatic factors. Absence of a yield figure indicates that the crop is not suited to or not commonly grown on the soil.

The predicted yields are based mainly on the experience and records of farmers, conservationists, and Cooperative Extension Service agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The latest soil and crop management practices used by many farmers in the county are assumed in predicting the yields. Hay and pasture yields are predicted for varieties of grasses and legumes suited to the soil. A few farmers may be using more advanced practices

TABLE 4.—*Yields per acre of crops and pasture*

[All yields were estimated for a high level of management in 1974. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover	Brome-grass-alfalfa
	Bu	*Bu*	*Bu*	*Bu*	*Ton*	*AUM* [1]	*AUM* [1]
Hickory: 8F2					2.2		3.4
Tama:							
36B	125	48	50	95	5.2		8.6
36C2	117	44	45	88	4.9		8.1
Worthen: 37B	126	39	51	75	5.3		8.2
Muscatine:							
41A	131	50	56	98	5.5		9.1
[2] U41B	129	49		96	5.5		9.1
Herrick: 46	125	45	53		5.2	8.6	
Ebbert: 48	113	38	47		4.5	7.5	
Virden: 50	124	42	51	66	4.7	7.1	
Atterberry: 61A	130	45	55	80	5.0	7.8	
Sable: 68	136	46	53	77	5.1	7.1	
Beaucoup: 70	115	40	50		4.8	8.0	
Darwin: [3] 71, [2,3] U71	90	32			3.0	4.5	
Darwin Variant: V71	94	34			3.2	4.6	
Otter: 76	120	40	42	60	4.2	7.0	
Littleton: 81A	133	42	54	79	5.4	8.0	
Okaw: [3] 84	73	25	36	49	2.8	3.4	
Bonnie: 108	90	32	40		3.8	5.5	
Shiloh: 138	117	40	47	62	4.4	7.0	
Onarga: 150B	91	30	38	56	3.8		6.0
Gorham: [3] 162	118	40	47	68	4.5	7.5	
Weir: 165	90	31	39		3.5	5.5	
Dupo: [3] 180	112	37	46	67	4.3	7.0	
Fayette:							
280B, 280B2, [2] U280B	113	43	45	78	4.7		7.8
280B3	108	41	40	65	4.5		7.5
280C2 [2] U280C	99	38	42	73	4.2		7.0
280C3	90	34	36	63	3.8		6.3
280D2	84	32	38	67	3.5		5.8
280D3				62	3.2		5.3
280E, [2] U280E					3.4		5.6
280E3					3.0		4.5
280G							
Landes: 304B	82	29	36	53	3.3		5.5

TABLE 4.—*Yields per acre of crops and pasture*—Continued

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover	Brome-grass-alfalfa
	Bu	*Bu*	*Bu*	*Bu*	*Ton*	*AUM* [1]	*AUM* [1]
Alford:							
308B, 308B2	113	42	48	78	4.7	----	7.8
308C2	99	38	44	74	4.2	----	7.0
308C3	90	37	42	63	3.8	----	6.3
308D2	84	33	38	67	3.5	----	5.8
308F3, H308F	----	----	----	----	2.8	----	5.5
H308C	105	35	45	----	4.5	----	7.1
H308D	100	33	42	----	4.2	----	5.9
Haymond: 331	125	44	50	68	4.7	----	7.6
Wakeland: 333	113	38	48	----	4.4	7.2	----
Hurst: 338A	76	29	39	----	3.3	5.5	----
338B2	63	25	27	----	3.1	4.5	----
338C2	58	22	25	----	3.1	4.5	----
S338B	73	25	25	----	3.1	4.5	----
Downs:							
386B	119	45	53	77	5.0	----	8.3
386C2	111	42	49	71	4.7	----	7.8
Udifluvents, loamy: 407	75	24	----	48	3.6	5.5	----
Karnak: [3] 426	84	29	34	46	2.8	3.5	----
Riley: 452, U452	100	35	----	66	4.2	6.5	----
Iva:							
454A	135	47	54	----	4.4	----	----
454B	135	47	54	----	4.4	----	----
454B2	118	36	48	----	4.7	----	7.8
Piasa: 474	67	25	32	44	2.8	4.5	----
Urban land:							
533.							
Martinsville: 570B	120	42	48	----	4.0	----	7.0
Parkville: [3] 619	103	38	----	----	4.5	----	7.5
Darmstadt:							
620A	60	24	32	----	2.7	4.2	----
620B2	55	20	29	----	2.6	4.0	----
620C3	----	----	----	----	2.4	3.5	----
Orthents:							
801C	85	25	28	48	4.0	6.0	----
801G	----	----	----	----	----	3.0	----
802.							
Alford:							
[2] 922C3	94	34	39	----	3.5	----	5.6

TABLE 4.—*Yields per acre of crops and pasture*—Continued

Soil name and map symbol	Corn	Soybeans	Wheat, winter	Oats	Grass-legume hay	Grass-clover	Brome-grass-alfalfa
	Bu	*Bu*	*Bu*	*Bu*	*Ton*	*AUM* [1]	*AUM* [1]
Alford:							
[2] 922D3					3.3		5.2
Sylvan:							
[2] 962E3					3.0		4.8
[2] 962G					3.3		5.0
[2] U962F							
Piasa: [2] 995	90	33	40		3.8	6.1	
Alford:							
[2] 999E3							
[2] 999F3							

[1] Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.
[2] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.
[3] Yields are for areas protected from flooding.

and obtaining average yields higher than those shown in table 4.

The management needed to achieve the indicated yields of the various crops depends upon the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

Crops other than those shown in table 4 are grown in the survey area, but because their acreage is small, predicted yields for these crops are not included. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information on the management of the soils for these crops.

Woodland Management and Productivity

Hardwood forests originally covered about 295,000 acres of St. Clair County. There now are 21,082 acres of woodland in St. Clair county, most of it in areas that can produce hardwoods of high quality.

Table 5 shows information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for those soils suitable for wood crops are listed numerically, and the ordination symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the symbol, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates no significant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the order in which the letters are listed above–x, w, t, d, c, s, f, and r.

In table 5 the soils are also rated for a number of factors to be considered in management. The ratings of slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of the hazard of erosion indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of equipment limitation reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that

TABLE 5.—*Woodland management and productivity*

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Hickory: 8F2	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
Worthen: 37B								Black walnut, American sycamore, yellow-poplar, red maple, hackberry, eastern white pine, green ash.
Herrick: 46								Eastern white pine, Norway spruce, black walnut, yellow-poplar, red maple.
Ebbert: 48								Pin oak, green ash, water tupelo.
Virden: 50								Pin oak, green ash, European larch.
Atterberry: 61A	3w	Slight	Slight	Slight	Slight	White oak Northern red oak Green ash Bur oak	70 70 	Eastern white pine, red pine, Scotch pine, eastern redcedar.
Sable: 68								Pin oak, green ash, European larch, eastern cottonwood.
Beaucoup: 70	2w	Slight	Moderate	Moderate	Moderate	Pin oak Eastern cottonwood Sweetgum Cherrybark oak American sycamore	90 100 	Eastern cottonwood, red maple, American sycamore, sweetgum, pin oak.
Darwin: 71, [1] U71	3w	Slight	Severe	Severe	Slight	Pin oak Swamp white oak Eastern cottonwood Green ash American sycamore	80 	Eastern cottonwood, American sycamore, red maple, green ash, pin oak.
Darwin variant: V71	3w	Slight	Severe	Severe	Slight	Pin oak Baldcypress Swamp white oak Eastern cottonwood Green ash	80 	Pin oak, American sycamore, red maple, green ash, eastern cottonwood.

Otter: 76	2w	Slight	Severe	Moderate	Moderate	Silver maple	94	Black spruce, green ash, eastern hemlock, pin oak, silver maple, eastern cottonwood, northern white-cedar.
Littleton: 81A								Eastern cottonwood, American sycamore, red maple, green ash, pin oak, sweetgum.
Okaw: 84	4w	Slight	Moderate	Moderate	Slight	Pin oak Blackjack oak Black oak	70 60 55	Pin oak, baldcypress, green ash, water tupelo, red maple, swamp white oak.
Bonnie: 108	2w	Slight	Moderate	Moderate	Severe	Pin oak Eastern cottonwood Sweetgum Cherrybark oak American sycamore	90 100 	Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, pin oak.
Shiloh: 138								Pin oak, baldcypress, swamp white oak, green ash, water tupelo.
Onarga: 150B								Eastern white pine, Scotch pine, eastern redcedar, red pine.
Gorham: 162	2w	Slight	Moderate	Moderate	Slight	Pin oak Eastern cottonwood Sweetgum Cherrybark oak American sycamore	90 100 	Eastern cottonwood, red maple, American sycamore, pin oak, sweetgum.
Weir: 165	4w	Slight	Moderate	Moderate	Slight	Pin oak White oak Black oak Pignut hickory	70 	Baldcypress, pin oak, water tupelo, red maple.
Dupo: 180								Black walnut, American sycamore, eastern cottonwood, green ash, yellow-poplar, red maple, cherrybark oak.
Fayette: 280B, 280B2, 280B3, 280C2, 280C3, [1] U280B, [1] U280C	2o	Slight	Slight	Slight	Slight	White oak Northern red oak	80 80	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, European larch, black walnut, sugar maple.

TABLE 5.—*Woodland management and productivity*—Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Fayette: 280D2, 280D3, 280E, 280E3, [1] U280E	2r	Moderate	Moderate	Slight	Slight	White oak Northern red oak	65 65	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, European larch, black walnut, sugar maple.
280G	2r	Severe	Severe	Slight	Slight	White oak Northern red oak	65 65	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, European larch, black walnut, sugar maple.
Landes: 304B	1o	Slight	Slight	Slight	Slight	Eastern cottonwood Yellow-poplar American sycamore Sweetgum Green ash	105 95 — — —	Eastern cottonwood, yellow-poplar, American sycamore, sweetgum, green ash, black walnut, eastern white pine, sugar maple.
Alford: 308B, 308B2, 308C2, 308C3, 308D2, H308C, H308D	1o	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
308F3, H308F	1r	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Haymond: 331	1o	Slight	Slight	Slight	Slight	Yellow-poplar White oak Black walnut	100 90 70	Eastern white pine, black walnut, yellow-poplar, black locust.
Wakeland: 333	2w	Slight	Moderate	Slight	Slight	Pin oak Sweetgum Yellow-poplar Virginia pine	90 85 90 90	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
Hurst: 338A, 338B2, 338C2, S338B	3w	Slight	Moderate	Slight	Slight	White oak Southern red oak White ash Bur oak	70 70 — —	Shortleaf pine, loblolly pine, eastern white pine, eastern redcedar.
Downs: 386B, 386C2	2o	Slight	Slight	Slight	Slight	White oak Northern red oak	80 80	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, European larch, black walnut, sugar maple.

Udifluvents, loamy: 407	1o	Slight	Slight	Slight	Slight	Eastern cottonwood American sycamore Yellow-poplar Cherrybark oak Sweetgum Green ash Southern red oak	105 95 	Black walnut, American sycamore, red maple, sweetgum, yellow-poplar.
Karnak: 426	2w	Slight	Moderate	Severe	Slight	Pin oak Swamp white oak Eastern cottonwood Green ash Silver maple	90 	Pin oak, swamp white oak, eastern cottonwood, green ash, red maple, baldcypress, sweetgum, water tupelo, pecan.
Riley: 452, U452	---	---	---	---	---	---	---	Eastern cottonwood, American sycamore, red maple, green ash, pin oak, sweetgum.
Iva: 454A, 454B, 454B2	2w	Slight	Moderate	Slight	Slight	White oak Pin oak Yellow-poplar Sweetgum	75 85 85 80	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
Piasa: 474	---	---	---	---	---	---	---	Green ash, eastern redcedar, osageorange.
Martinsville: 570B	1o	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, white ash, yellow-poplar, black walnut, black locust.
Parkville: 619	2c	Slight	Moderate	Severe	Slight	Eastern cottonwood Pin oak	100 90	Eastern cottonwood, pin oak, pecan, sweetgum, American sycamore.
Darmstadt: 620A, 620B2, 620C3	3t	Slight	Slight	Moderate	Slight	White oak Black oak Pignut hickory	70 70 	Eastern white pine, white oak, green ash, eastern redcedar, osageorange.
Orthents: 801C, 801G, 802	---	---	---	---	---	---	---	Eastern white pine, red pine, eastern redcedar, eastern cottonwood, green ash, white oak, southern red oak.
Alford: [1]922C3: Alford part	1o	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Hurst part	3w	Slight	Moderate	Slight	Slight	White oak Southern red oak White ash Bur oak	70 70 	Shortleaf pine, loblolly pine, eastern white pine, eastern redcedar.

TABLE 5.—*Woodland management and productivity*—Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Alford: [1]922D3: Alford part	1o	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Hurst part	3w	Slight	Moderate	Slight	Slight	White oak Southern red oak White ash Bur oak	70 70 — —	Shortleaf pine, loblolly pine, eastern white pine, eastern redcedar.
Sylvan: [1]962E3: Sylvan part	2r	Moderate	Moderate	Moderate	Slight	Yellow-poplar White oak Northern red oak Black walnut	90 80 80 —	White oak, black walnut, northern red oak, green ash, eastern white pine, red pine, sugar maple.
Bold part	—	—	—	—	—	—	—	Eastern redcedar, green ash, black locust.
[1]962G: Sylvan part. Bold part	—	—	—	—	—	—	—	Eastern redcedar, green ash, black locust.
[1]U962F: Sylvan part Bold part.	—	—	—	—	—	—	—	Eastern redcedar, green ash, black locust.
Piasa: [1]995: Piasa part	—	—	—	—	—	—	—	Green ash, eastern redcedar, osageorange.
Herrick part	—	—	—	—	—	—	—	Eastern white pine, Norway spruce, black walnut, yellow-poplar, red maple.
Alford: [1]999E3: Alford part	1o	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 — — — 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.

Alford: [1] 999F3:								
Alford part	1r	Moderate	Moderate	Slight	Slight	White oak	90	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
						Yellow-poplar	98	
						Sweetgum	76	
Hickory part	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak	85	
						Black oak		
						Green ash		
						Bitternut hickory		
						Yellow-poplar	95	

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor (fig. 13). The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of windthrow hazard are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The potential productivity of merchantable trees on a soil is expressed as a site index. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands (*4, 5, 6, 9*).

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

The section provides information about the use of soils for building sites, sanitary facilities, construction materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the tables in this section are based on test data and on the estimates of engineering properties in the "Soil Properties" section of this survey. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock that is within a depth of 5 or 6 feet, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding (fig. 14), natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the

Figure 13.—Severe plant competition on Okaw silt loam.

Figure 14.—**Flooded and ponded area of Darwin silty clay. In many places urban uses are expanding onto these flood-prone areas.**

sand and silt fractions, and the kind of absorbed cations were also considered.

Based on the information assembled about soil properties, ranges of values may be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values may be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternate sites for location of sanitary landfill, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geological material; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 6 shows for each kind of soil, ratings of the degree and kind of limitations for building site development; table 7, for sanitary facilities; and table 8, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have dif-

ferent meanings in soil science and in engineering. The Glossary defines many of these terms.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 6. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated *severe,* such costly measure may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness and depth to a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise stated.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and small commercial buildings referred to in table 6 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation do not occur. These ratings were determined from the estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Local roads and streets referred to in table 6 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load-supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO and Unified classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic-supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers and content of large stones, all of which affect stability and ease of excavation, were also considered.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfill. The nature of the soil is important in selecting sites for these facilities and in identifying soil properties and site features that are limitations in design and installation. Also, those soil properties that deal with the ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 7 shows the degree and kind of limitations of each soil for these uses and for use as daily cover for landfills.

If the degree of soil limitation is *slight,* soils are favorable for the specified use and limitations are minor and easily overcome; if *moderate,* soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe,* soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the surface horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it may be feasible to install special systems that lower the seasonal high water table or to increase the size of the

TABLE 6.—*Building site development*

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Hickory: 8F2	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope.
Tama:					
36B	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.
36C2	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.
Worthen: 37B	Slight	Slight	Slight	Slight	Severe: frost action.
Muscatine: 41A, [1] U41B	Severe: wetness.	Moderate: wetness, low strength, shrink-swell.	Severe: wetness.	Moderate: wetness, low strength, shrink-swell.	Severe: low strength, frost action.
Herrick: 46	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: frost action, shrink-swell, low strength.
Ebbert: 48	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action.
Virden: 50	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, frost action, shrink-swell.
Atterberry: 61A	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action, low strength.
Sable: 68	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, low strength.
Beaucoup: 70	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, low strength.
Darwin: 71, [1] U71	Severe: wetness, too clayey, floods.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, wetness.	Severe: wetness, shrink-swell, floods.
Darwin variant: V71	Severe: wetness, floods, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.
Otter: 76	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.
Littleton: 81A	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness	Severe: frost action.
Okaw: 84	Severe: wetness, floods, too clayey.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, low strength.
Bonnie: 108	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action.
Shiloh: 138	Severe: wetness, too clayey, floods.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: wetness, frost action, floods.

TABLE 6.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Onarga: 150B	Slight	Slight	Slight	Slight	Moderate: frost action, low strength.
Gorham: 162	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action, low strength.
Weir: 165	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, shrink-swell.
Dupo: 180	Severe: wetness, floods.	Severe: floods, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, shrink-swell.	Severe: floods, frost action, shrink-swell.
Fayette:					
280B	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.
280B2, 280B3, [1] U280B.	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.
280C2, 280C3, [1] U280C.	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, low strength, shrink-swell.	Severe: slope	Severe: frost action, low strength.
280D2, 280D3, 280E, 280E3, 280G, [1] U280E.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: frost action, low strength, slope.
Landes: 304B	Moderate: cutbanks cave, floods.	Severe: floods	Severe: floods	Severe: floods	Moderate: floods, frost action.
Alford:					
308B, 308B2	Slight	Slight	Slight	Slight	Severe: frost action, low strength.
308C2, 308C3, H308C	Slight	Slight	Slight	Moderate: slope.	Severe: frost action, low strength.
308D2, H308D	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: frost action, low strength.
308F3, H308F	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: frost action, slope.
Haymond: 331	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: floods, frost action.
Wakeland: 333	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.
Hurst:					
338A, 338B2, 338C2	Severe: wetness, too clayey.	Severe: shrink-swell, floods, low strength.	Severe: wetness, shrink-swell, floods.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, frost action low strength.
S338B	Severe: wetness, cutbanks cave.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell low strength.

TABLE 6.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Downs:					
386B	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.
386C2	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.
Udifluvents, loamy: 407	Severe: wetness, floods, cutbanks cave.	Severe: floods	Severe: floods, wetness.	Severe: floods	Severe: floods.
Karnak: 426	Severe: too clayey, wetness.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.
Riley: 452, U452	Severe: wetness, floods.	Severe: floods	Severe: wetness, floods.	Severe: floods	Severe: floods, frost action.
Iva: 454A, 454B, 454B2	Severe: wetness.	Moderate: wetness, low strength.	Severe: wetness.	Moderate: wetness, low strength.	Severe: frost action, low strength.
Piasa: 474	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: frost action, wetness, shrink-swell.
Urban land: 533.					
Martinsville: 570B	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: frost action, shrink-swell, low strength.
Parkville: 619	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, low strength.
Darmstadt:					
620A, 620B2	Severe: wetness.	Moderate: wetness, low strength.	Severe: wetness.	Moderate: wetness, low strength.	Severe: frost action, low strength.
620C3	Severe: wetness.	Moderate: wetness, low strength.	Severe: wetness.	Moderate: wetness, low strength, slope.	Severe: frost action, low strength.
Orthents:					
801C	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: slope, large stones.	Severe: frost action, large stones.
801G	Severe: slope	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: frost action, large stones.
802	Moderate: cutbanks cave.	Moderate: low strength.	Moderate: low strength.	Severe: slope	Moderate: frost action, low strength.
Alford:					
[1]922C3:					
Alford part	Slight	Slight	Slight	Moderate: slope.	Severe: frost action, low strength.
Hurst part	Severe: wetness, too clayey.	Severe: shrink-swell, floods, low strength.	Severe: wetness, shrink-swell, floods.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, frost action, low strength.

TABLE 6.—*Building site development*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Alford:					
[1] 922D3:					
Alford part	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope	Severe: frost action, low strength.
Hurst part	Severe: wetness, too clayey.	Severe: shrink-swell, floods, low strength.	Severe: wetness, shrink-swell, floods.	Severe: shrink-swell, floods, low strength.	Severe: shrink-swell, frost action, low strength.
Sylvan:					
[1] 962E3:					
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, frost action, low strength.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
[1] 962G:					
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, frost action, low strength.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
[1] U962F:					
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, frost action, low strength.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Piasa:					
[1] 995:					
Piasa part	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: frost action, wetness, shrink-swell.
Herrick part	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: frost action, shrink-swell, low strength.
Alford:					
[1] 999E3:					
Alford part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: frost action, slope.
Hickory part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope.
[1] 999F3:					
Alford part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: frost action, slope.
Hickory part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level flow area surrounded by cut slopes or embankments of compacted nearly impervious soil material. They generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil at least 4 feet thick for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that are very high in organic-matter content and those that have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water

TABLE 7.—*Sanitary facilities*

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Hickory: 8F2	Severe: slope	Severe: slope	Moderate: too clayey.	Severe: slope	Poor: slope.
Tama: 36B, 36C2	Slight	Moderate: slope, seepage, excess humus.	Moderate: too clayey.	Slight	Fair: too clayey.
Worthen: 37B	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Muscatine: 41A, [1] U41B	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Herrick: 46	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey.
Ebbert: 48	Severe: wetness, percs slowly.	Slight	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Virden: 50	Severe: percs slowly, wetness.	Slight	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Atterberry: 61A	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Sable: 68	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, area reclaim.
Beaucoup: 70	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Darwin: 71, [1] U71	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
Darwin variant: V71	Severe: wetness, floods.	Severe: seepage, wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods.	Poor: too clayey, wetness.
Otter: 76	Severe: wetness, floods.	Severe: floods	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Littleton: 81A,	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Good.
Okaw: 84	Severe: percs slowly, floods, wetness.	Slight	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness, area reclaim.
Bonnie: 108	Severe: floods, percs slowly, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Shiloh: 138	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
Onarga: 150B	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Gorham: 162	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Weir: 165	Severe: wetness, percs slowly.	Slight	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.

TABLE 7.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Dupo: 180	Severe: percs slowly, wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Fair: thin layer.
Fayette: 280B, 280B2, 280B3, [1] U280B	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
280C2, 280C3, [1] U280C	Moderate: slope.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
280D2, 280D3, 280E, 280E3, [1] U280E.	Severe: slope	Severe: slope, seepage.	Moderate: slope.	Severe: slope	Poor: slope.
280G	Severe: slope	Severe: slope, seepage.	Severe: slope	Severe: slope	Poor: slope.
Landes: 304B	Moderate: floods.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Alford: 308B, 308B2, H308C	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Alford: 308C2, 308C3	Slight	Severe: slope	Slight	Slight	Good.
308D2, H308D	Moderate: slope.	Severe: slope	Slight	Moderate: slope.	Fair: slope.
308F3	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
H308F	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Haymond: 331	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Good.
Wakeland: 333	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Hurst: 338A	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
338B2	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
338C2	Severe: percs slowly, wetness.	Severe: slope	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
S338B	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness.	Poor: too clayey.
Downs: 386B, 386C2	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
Udifluvents, loamy: 407	Severe: floods, wetness.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Poor: too sandy.
Karnak: 426	Severe: percs slowly, wetness, floods.	Slight	Severe: too clayey, wetness, floods.	Severe: wetness, floods.	Poor: wetness, too clayey.
Riley: 452, U452	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods	Fair: thin layer, too clayey.

TABLE 7.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Iva:					
454A	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
454B, 454B2	Severe: wetness, percs slowly.	Moderate: slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Piasa: 474	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land: 533.					
Martinsville: 570B	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
Parkville: 619	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: floods, seepage.	Severe: floods, wetness, seepage.	Fair: too clayey.
Darmstadt:					
620A	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Fair: too clayey.
620B2	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
620C3	Severe: percs slowly, wetness.	Severe: slope	Severe: wetness.	Severe: wetness.	Fair: too clayey.
Orthents:					
801C	Severe: percs slowly.	Moderate: slope.	Moderate: large stones.	Slight	Fair: large stones.
801G	Severe: percs slowly, slope.	Severe: slope	Severe: large stones, slope.	Severe: slope	Poor: slope.
802	Moderate: percs slowly.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: area reclaim.
Alford:					
[1] 922C3:					
Alford part	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
Hurst part	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
[1] 922D3:					
Alford part	Moderate: slope.	Severe: slope	Slight	Moderate: slope.	Fair: slope.
Hurst part	Severe: percs slowly, wetness.	Severe: slope	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
Sylvan:					
[1] 962E3:					
Sylvan part	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Bold part	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Sylvan:					
[1] 962G:					
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
[1] U962F:					
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.

TABLE 7.—*Sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Piasa: [1] 995:					
Piasa part	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Herrick part	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey.
Alford: [1] 999E3:					
Alford part	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Hickory part	Severe: slope	Severe: slope	Moderate: too clayey.	Severe: slope	Poor: slope.
[1] 999F3:					
Alford part	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Hickory part	Severe: slope	Severe: slope	Moderate: too clayey.	Severe: slope	Poor: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce its capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the location of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of a solid waste, either in excavated trenches or on the surface of the soil. The waste is spread compacted in layers and covered with thick layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal high water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and is a limitation to excavating and filling the trenches. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 7 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area-type sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

In addition to these features, the soils selected for final cover of landfill should be suitable for growing plants. In comparison with other horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Water management

Many soil properties and site features that affect water management are identified in table 8. Soil and site features that affect use are indicated for each kind of soil. This information is significant in plan-

ning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by the permeability and depth over fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and is of favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

An aquifer-fed excavated pond is a body of water created by excavating a pit or dugout into a groundwater aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 8 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soils is affected by such soil properties as permeability, texture, structure, depth to claypan or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff and allow the water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at nonerosive velocities. Features that affect the use of soils for waterways are slope, permeability, erodibility, and suitability for permanent vegetation.

Construction materials

The suitability of each soil as a source of road fill, sand, gravel, and topsoil is indicated in table 9 by ratings of *good, fair,* or *poor.* The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Road fill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about soil properties that determine such performance is given in the descriptions of soil series.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within the profile. The estimated engineering properties in the section "Soil Properties" provide more specific information about the nature of each horizon that can help determine its suitability for road fill.

According to the Unified soil classification system, soils rated *good* have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor,* regardless of the quality of the suitable material.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in the section "Soil Properties."

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material in their surface. They are free of stones, are low in content of gravel and other coarse fragments, and have gentle slopes. They are low in soluble salts, which can limit plant growth. They are naturally fertile or respond well to fertilization. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy or firm loamy or clayey soils; soils that have suitable layers less than 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils; very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have a large amount of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is much preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter. Consequently,

TABLE 8.—*Water management*

["Seepage," and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Hickory: 8F2	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Tama: 36B, 36C2	Seepage	Compressible, low strength, erodes easily.	No water	Not needed	Favorable	Favorable.
Worthen: 37B	Seepage	Low strength	No water	Not needed	Favorable	Favorable.
Muscatine: 41A, [1] U41B	Seepage	Compressible, low strength, shrink-swell.	Deep to water	Favorable	Favorable	Favorable.
Herrick: 46	Favorable	Low strength, shrink-swell.	Deep to water	Wetness	Not needed	Wetness.
Ebbert: 48	Favorable	Compressible, low strength.	Favorable	Percs slowly, wetness.	Not needed	Not needed.
Virden: 50	Favorable	Shrink-swell	Favorable	Percs slowly	Not needed	Not needed.
Atterberry: 61A	Favorable	Compressible, piping.	Deep to water	Favorable	Favorable	Favorable.
Sable: 68	Favorable	Low strength	Favorable	Wetness	Not needed	Not needed.
Beaucoup: 70	Favorable	Shrink-swell, low strength.	Favorable	Floods	Wetness	Wetness.
Darwin: 71, [1] U71	Favorable	Hard to pack, shrink-swell.	Slow refill	Percs slowly, floods.	Not needed	Not needed.
Darwin variant: V71	Seepage	Shrink-swell	Favorable	Floods, percs slowly.	Not needed	Not needed.
Otter: 76	Favorable	Low strength	Favorable	Floods, wetness.	Not needed	Not needed.
Littleton: 81A	Seepage	Low strength	Deep to water	Favorable	Favorable	Favorable.
Okaw: 84	Favorable	Low strength, shrink-swell.	Slow refill	Floods, percs slowly, poor outlets.	Percs slowly, wetness.	Percs slowly, wetness.
Bonnie: 108	Favorable	Low strength, piping.	Favorable	Floods, wetness.	Not needed	Not needed.
Shiloh: 138	Favorable	Shrink-swell, low strength.	Favorable	Percs slowly, floods.	Not needed	Not needed.
Onarga: 150B	Seepage	Favorable	No water	Not needed	Favorable	Favorable.
Gorham: 162	Favorable	Low strength	Favorable	Floods, wetness.	Not needed	Not needed.
Weir: 165	Favorable	Low strength	Slow refill	Percs slowly, floods.	Not needed	Not needed.

Dupo: 180	Favorable	Shrink-swell	Favorable	Percs slowly, floods.	Not needed	Not needed.
Fayette: 280B, 280B2, 280B3, 280C2, 280C3, 280D2, 280D3, 280E, 280E3, 280G, [1] U280B, [1] U280C, [1] U280E.	Seepage, slope	Compressible, low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily, piping.	Favorable.
Landes: 304B	Seepage	Seepage, piping.	Deep to water	Not needed	Favorable	Not needed.
Alford: 308B, 308B2, 308C2, 308C3, 308D2, 308F3, H308C, H308D, H308F.	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Haymond: 331	Seepage	Piping, low strength.	Deep to water	Not needed	Not needed	Not needed.
Wakeland: 333	Seepage	Piping, low strength.	Deep to water	Frost action, floods, wetness.	Not needed	Not needed.
Hurst: 338A, 338B2, 338C2	Favorable	Hard to pack, low strength, shrink-swell.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
S338B	Seepage	Hard to pack, low strength, shrink-swell.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
Downs: 386B, 386C2	Seepage	Compressible, low strength, erodes easily.	No water	Not needed	Erodes easily, piping.	Favorable.
Udifluvents, loamy: 407	Seepage	Piping	Favorable	Floods, cutbanks cave.	Piping	Erodes easily.
Karnak: 426	Favorable	Compressible, low strength, shrink-swell.	Slow refill	Poor outlets, percs slowly, wetness.	Not needed	Not needed.
Riley: 452, U452	Seepage	Favorable	Deep to water	Favorable	Not needed	Not needed.
Iva: 454A, 454B, 454B2	Favorable	Low strength, erodes easily.	Deep to water	Percs slowly, wetness.	Erodes easily, wetness.	Erodes easily, wetness.
Piasa: 474	Favorable	Low strength, shrink-swell.	Deep to water	Percs slowly, excess salt.	Not needed	Not needed.
Urban land: 533.						
Martinsville: 570B	Seepage	Erodes easily	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Parkville: 619	Seepage	Compressible, low strength, piping.	Deep to water	Floods, wetness.	Wetness	Wetness.
Darmstadt: 620A, 620B2, 620C3	Favorable	Low strength	Deep to water	Percs slowly, excess salt.	Percs slowly, wetness, erodes easily.	Erodes easily, excess salt.
Orthents: 801C, 801G	Slope	Large stones	No water	Not needed	Erodes easily, large stones.	Erodes easily, large stones.
802	Seepage	Favorable	No water	Not needed	Erodes easily	Erodes easily, slope.

TABLE 8.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Alford:						
[1] 922C3:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Hurst part	Favorable	Hard to pack, low strength, shrink-swell.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
[1] 922D3:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Hurst part	Favorable	Hard to pack, low strength, shrink-swell.	Deep to water	Percs slowly	Percs slowly	Percs slowly.
Sylvan:						
[1] 962E3:						
Sylvan part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Bold part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope	Erodes easily, slope.
[1] 962G:						
Sylvan part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Bold part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope	Erodes easily, slope.
[1] U962F:						
Sylvan part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
Bold part	Seepage, slope	Low strength, piping.	No water	Not needed	Slope	Erodes easily, slope.
Piasa:						
[1] 995:						
Piasa part	Favorable	Low strength, shrink-swell.	Deep to water	Percs slowly, excess salt.	Not needed	Not needed.
Herrick part	Favorable	Low strength, shrink-swell.	Deep to water	Wetness	Not needed	Wetness.
Alford:						
[1] 999E3:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
[1] 999F3:						
Alford part	Seepage	Low strength, erodes easily.	No water	Not needed	Complex slope, erodes easily.	Erodes easily.
Hickory part	Slope	Low strength, shrink-swell.	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 9.—*Construction materials*

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hickory: 8F2	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Tama: 36B, 36C2	Poor: low strength, excess humus.	Unsuited	Unsuited	Fair: thin layer.
Worthen: 37B	Poor: frost action	Unsuited	Unsuited	Good.
Muscatine: 41A, [1] U41B	Poor: low strength, excess humus.	Unsuited	Unsuited	Good.
Herrick: 46	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
Ebbert: 48	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness.
Virden: 50	Poor: wetness, shrink-swell, frost action.	Unsuited	Unsuited	Poor: wetness.
Atterberry: 61A	Poor: frost action, low strength.	Unsuited	Unsuited	Fair: thin layer.
Sable: 68	Poor: wetness, frost action, low strength.	Unsuited	Unsuited	Poor: wetness.
Beaucoup: 70	Poor: wetness, low strength, frost action.	Unsuited	Unsuited	Poor: wetness.
Darwin: 71, [1] U71	Poor: shrink-swell, wetness, low strength.	Unsuited	Unsuited	Poor: too clayey, wetness.
Darwin variant: V71	Poor: wetness, shrink-swell, area reclaim.	Fair: excess fines	Unsuited	Poor: too clayey, wetness, area reclaim.
Otter: 76	Poor: frost action, wetness.	Unsuited	Unsuited	Poor: wetness.
Littleton: 81A	Poor: frost action	Unsuited	Unsuited	Good.
Okaw: 84	Poor: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Poor: wetness, area reclaim.
Bonnie: 108	Poor: frost action, wetness.	Unsuited	Unsuited	Poor: wetness.

TABLE 9.—*Construction materials*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Shiloh: 138	Poor: shrink-swell, frost action, wetness.	Unsuited	Unsuited	Poor: too clayey, wetness.
Onarga: 150B	Moderate: frost action, low strength.	Poor: excess fines	Unsuited	Good.
Gorham: 162	Poor: frost action, wetness.	Poor: excess fines	Unsuited	Poor: wetness.
Weir: 165	Poor: wetness, frost action.	Unsuited	Unsuited	Poor: wetness.
Dupo: 180	Poor: frost action	Unsuited	Unsuited	Fair: thin layer.
Fayette: 280B, 280B2, 280B3, [1] U280B	Poor: low strength.	Unsuited	Unsuited	Good.
280C2, 280C3, [1] U280C	Poor: low strength.	Unsuited	Unsuited	Fair: slope.
280D2, 280D3, 280E, 280E3, [1] U280E	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
280G	Poor: low strength, slope.	Unsuited	Unsuited	Poor: slope.
Landes: 304B	Fair: frost action	Fair: excess fines	Unsuited	Good.
Alford: 308B, 308B2, 308C2, 308C3, H308C	Poor: frost action	Unsuited	Unsuited	Fair: thin layer.
Alford: 308D2, H308D	Poor: frost action	Unsuited	Unsuited	Fair: thin layer, slope.
308F3	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.
H308F	Poor: frost action	Unsuited	Unsuited	Poor: slope.
Haymond: 331	Poor: frost action	Unsuited	Unsuited	Good.
Wakeland: 333	Poor: frost action	Unsuited	Unsuited	Good.
Hurst: 338A, 338B2, 338C2	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
S338B	Poor: shrink-swell, low strength.	Poor: excess fines	Unsuited	Fair: thin layer.
Downs: 386B, 386C2	Poor: low strength.	Unsuited	Unsuited	Good.
Udifluvents, loamy: 407	Moderate: frost action.	Fair: thin layer	Unsuited	Poor: too sandy.
Karnak: 426	Poor: area reclaim, shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, wetness.

TABLE 9.—*Construction materials*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Riley: 452, U452	Poor: frost action	Poor: excess fines	Unsuited	Fair: too clayey.
Iva: 454A, 454B, 454B2	Poor: frost action, low strength.	Unsuited	Unsuited	Good.
Piasa: 474	Poor: wetness, frost action, shrink-swell.	Unsuited	Unsuited	Poor: wetness, area reclaim.
Urban land: 533.				
Martinsville: 570B	Fair: frost action, shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
Parkville: 619	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Darmstadt: 620A, 620B2, 620C3	Poor: frost action, low strength.	Unsuited	Unsuited	Fair: thin layer.
Orthents: 801C	Poor: frost action, large stones.	Unsuited	Unsuited	Fair: large stones.
801G	Poor: frost action, large stones.	Unsuited	Unsuited	Poor: slope.
802	Fair: frost action, low strength.	Unsuited	Unsuited	Fair: area reclaim.
Alford: [1] 922C3: Alford part	Poor: frost action	Unsuited	Unsuited	Fair: thin layer.
Hurst part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
[1] 922D3: Alford part	Poor: frost action	Unsuited	Unsuited	Fair: thin layer, slope.
Hurst part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer, slope.
Sylvan: [1] 962E3: Sylvan part	Poor: low strength, frost action.	Unsuited	Unsuited	Poor: slope.
Bold part	Poor: frost action	Unsuited	Unsuited	Poor: slope.
[1] 962G: Sylvan part	Poor: slope, frost action, low strength.	Unsuited	Unsuited	Poor: slope.
Bold part	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.
[1] U962F: Sylvan part	Poor: slope, frost action, low strength.	Unsuited	Unsuited	Poor: slope.
Bold part	Poor: frost action, slope.	Unsuited	Unsuited	Poor: slope.

TABLE 9.—*Construction materials*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Piasa: [1] 995:				
Piasa part	Poor: wetness, frost action, shrink-swell.	Unsuited	Unsuited	Poor: wetness, area reclaim.
Herrick part	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: thin layer.
Alford: [1] 999E3:				
Alford part	Poor: frost action	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
[1] 999F3:				
Alford part	Poor: frost action	Unsuited	Unsuited	Poor: slope.
Hickory part	Poor: low strength.	Unsuited	Unsuited	Poor: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

careful preservation and use of material from these horizons is desirable.

Recreation

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited for recreational use, in varying degree, by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 10 the limitations of soils are rated slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, or limited use, or by a combination of these measures.

The information in table 10 can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 7, and interpretations for dwellings without basements and for local roads and streets, given in table 6.

Camp areas require such site preparation as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic, but most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet nor subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over rock should be sufficient to allow necessary grading.

The design and layout of *paths and trails* for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes and few or no stones or boulders on the surface.

Wildlife

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populates an

TABLE 10.—*Recreational development*

["Shrink-swell" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Hickory: 8F2	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Tama: 36B, 36C2	Slight	Slight	Moderate: slope	Slight.
Worthen: 37B	Slight	Slight	Moderate: slope	Slight.
Muscatine: 41A, [1] U41B	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness.
Herrick: 46	Moderate: wetness, percs slowly.	Moderate: wetness	Moderate: wetness, percs slowly.	Moderate: wetness.
Ebbert: 48	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
Virden: 50	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
Atterberry: 61A	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness.
Sable: 68	Severe: wetness, floods.	Severe: wetness	Severe: wetness	Severe: wetness.
Beaucoup: 70	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.
Darwin: 71, [1] U71	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness.
Darwin variant: V71	Severe: wetness, floods, percs slowly.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.
Otter: 76	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness.
Littleton: 81A	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness.
Okaw: 84	Severe: wetness, percs slowly, floods.	Severe: wetness	Severe: wetness, percs slowly.	Severe: wetness.
Bonnie: 108	Severe: wetness, floods.	Severe: wetness	Severe: wetness, floods.	Severe: wetness.
Shiloh: 138	Severe: wetness, floods, percs slowly.	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Onarga: 150B	Slight	Slight	Moderate: slope	Slight.
Gorham: 162	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, too clayey.	Severe: wetness.
Weir: 165	Severe: wetness, floods, percs slowly.	Severe: wetness	Severe: wetness, floods, percs slowly.	Severe: wetness.

TABLE 10.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Dupo: 180	Severe: floods, wetness.	Moderate: wetness, floods.	Moderate: floods, wetness.	Moderate: wetness.
Fayette: 280B, 280B2, 280B3, [1] U280B	Slight	Slight	Moderate: slope	Slight.
280C2, 280C3, [1] U280C	Moderate: slope	Moderate: slope	Severe: slope	Slight.
280D2, 280D3, 280E, 280E3, [1] U280E	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
280G	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Landes: 304B	Moderate: floods	Slight	Moderate: slope	Slight.
Alford: 308B, 308B2, H308C	Slight	Slight	Moderate: slope	Slight.
308C2, 308C3	Slight	Slight	Severe: slope	Slight.
308D2, H308D	Moderate: slope	Moderate: slope	Severe: slope	Slight.
308F3	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Alford: H308F	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Haymond: 331	Severe: floods	Moderate: floods	Severe: floods	Moderate: floods.
Wakeland: 333	Severe: floods	Severe: floods	Severe: floods	Moderate: floods, wetness.
Hurst: 338A, 338B2, 338C2, S338B	Severe: percs slowly.	Moderate: wetness	Severe: percs slowly.	Moderate: wetness.
Downs: 386B	Slight	Slight	Moderate: slope	Slight.
386C2	Slight	Slight	Severe: slope	Slight.
Udifluvents, loamy: 407	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Moderate: floods, wetness.
Karnak: 426	Severe: wetness, too clayey, percs slowly.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.
Riley: 452, U452	Severe: floods, wetness.	Moderate: wetness, floods, too clayey.	Moderate: wetness, floods, too clayey.	Moderate: wetness, floods, too clayey.
Iva: 454A, 454B, 454B2	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness.
Piasa: 474	Severe: wetness, percs slowly.	Severe: wetness	Severe: wetness, percs slowly.	Severe: wetness.
Urban land: 533.				
Martinsville: 570B	Slight	Slight	Moderate: slope	Slight.
Parkville: 619	Severe: floods, wetness.	Severe: too clayey	Severe: floods, wetness.	Severe: too clayey.

TABLE 10.—*Recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Darmstadt:				
620A, 620B2	Severe: wetness, percs slowly.	Moderate: wetness	Severe: wetness, percs slowly.	Moderate: wetness.
620C3	Severe: wetness, percs slowly.	Moderate: wetness	Severe: wetness, percs slowly, slope.	Moderate: wetness.
Orthents:				
801C	Moderate: large stones.	Moderate: slope, large stones.	Severe: slope, large stones.	Moderate: large stones.
801G	Severe: slope	Severe: slope	Severe: slope, large stones.	Severe: slope.
802	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Alford:				
[1] 922C3:				
Alford part	Slight	Slight	Moderate: slope	Slight.
Hurst part	Severe: percs slowly.	Moderate: wetness	Severe: percs slowly.	Moderate: wetness.
[1] 922D3:				
Alford part	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Hurst part	Severe: percs slowly.	Moderate: wetness	Severe: percs slowly.	Moderate: wetness.
Sylvan:				
[1] 962E3:				
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Bold part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
[1] 962G:				
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
[1] 962F:				
Sylvan part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Bold part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Piasa:				
[1] 995:				
Piasa part	Severe: wetness, percs slowly.	Severe: wetness	Severe: wetness, percs slowly.	Severe: wetness.
Herrick part	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Moderate: wetness.
Alford:				
[1] 999E3:				
Alford part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Hickory part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
[1] 999F3:				
Alford part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Hickory part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife will either be scarce or will not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering the natural establishment of desirable plants.

In table 11 the soils in the survey area are rated

TABLE 11.—*Wildlife habitat potentials*

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Open-land wildlife	Woodland wildlife	Wetland wildlife
Hickory: 8F2	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Tama:										
36B	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
36C2	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Worthen: 37B	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Muscatine: 41A, [1] U41B	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Herrick: 46	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ebbert: 48	Fair	Fair	Fair	Fair	Poor	Fair	Good	Fair	Fair	Fair.
Virden: 50	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Atterberry: 61A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Sable: 68	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
Beaucoup: 70	Good	Good	Good	Good	Poor	Fair	Good	Good	Good	Fair.
Darwin: 71, [1] U71	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Darwin variant: V71	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Otter: 76	Fair	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
Littleton: 81A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Okaw: 84	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Bonnie: 108	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Shiloh: 138	Fair	Fair	Fair	Fair	Poor	Fair	Good	Fair	Fair	Fair.
Onarga: 150B	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Gorham: 162	Good	Fair	Good	Fair	Fair	Poor	Fair	Good	Fair	Fair.
Weir: 165	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Dupo: 180	Good	Good	Good	Good	Good	Fair	Good	Good	Good	Fair.

Fayette:										
280B, 280B2, 280B3, [1] U280B.	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
280C2, 280C3, [1] U208C	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
280D2, 280D3, 280E, 280E3, [1] U280E.	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
280G.										
Landes: 304B	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Alford:										
308B, 308B2, H308C	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
308C2, 308C3, H308D	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
308D2, H308F	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
308F3	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
Haymond: 331	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
Wakeland: 333	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Hurst:										
338A	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
338B2, S338B	Fair	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor.
338C2.										
Downs:										
386B	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
386C2	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Udifluvents, loamy: 407	Fair	Fair	Good	Good	Fair	Poor	Fair	Fair	Good	Poor.
Karnak: 426	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Riley: 452, U452	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Iva:										
454A	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
454B, 454B2	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Piasa: 474	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Urban land: 533										
Martinsville: 570B	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.

TABLE 11.—*Wildlife habitat potentials*—Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for—		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Open-land wildlife	Woodland wildlife	Wetland wildlife
Parkville: 619	Fair	Fair	Fair	Good	Good	Poor	Fair	Fair	Good	Poor.
Darmstadt:										
620A	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair.
620B2	Poor	Good	Good	Fair	Fair	Poor	Fair	Fair	Fair	Poor.
620C3	Very poor	Fair	Good	Fair	Fair	Very poor	Poor	Poor	Fair	Very poor.
Orthents:										
801C	Fair	Good	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor.
801G	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor.
802	Fair	Good	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor.
Alford:										
[1]922C3:										
Alford part	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
Hurst part	Fair	Good	Good	Fair	Fair	Fair	Poor	Good	Fair	Poor.
[1]922D3:										
Alford part	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
Hurst part	Fair	Good	Good	Fair	Fair	Fair	Poor	Good	Fair	Poor.
Sylvan:										
[1]962E3:										
Sylvan part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Bold part	Poor	Fair	Good	Poor	Poor	Very poor	Very poor	Fair	Fair	Very poor.
[1]962G:										
Sylvan part	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Bold part	Very poor	Fair	Good	Poor	Poor	Very poor	Very poor	Fair	Fair	Very poor.
[1]U962F:										
Sylvan part	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Bold part	Very poor	Fair	Good	Poor	Poor	Very poor	Very poor	Fair	Fair	Very poor.

Piasa:										
[1] 995:										
Piasa part	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Herrick part	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Alford:										
[1] 999E3:										
Alford part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Hickory part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
[1] 999F3:										
Alford part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Hickory part	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, sorghum, wheat, oats, barley, millet, buckwheat, cowpeas, soybeans, and sunflowers. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, bluegrass, lovegrass, switchgrass, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, and crownvetch. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and moisture are also considerations.

Wild herbaceous plants are native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are blustem, indiangrass, goldenrod, beggarweed, pokeweed, partridgepea, wheatgrass, fescue, and grama. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, persimmon, sassafras, sumac, hickory, hazelnut, black walnut, blackberry, grape, blackhaw, viburnum, blueberry, bayberry, and briers. Examples of fruit-producing shrubs that are commercially available and are suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, and juniper. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, wildrice, saltgrass, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Open-land habitat consists of croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, killdeer, cottontail rabbit, red fox, and woodchuck.

Woodland habitat consists of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, woodcock, thrushes, vireos, woodpeckers, squirrels, grey fox, raccoon, and deer.

Wetland habitat consists of plants that thrive in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver.

Soil Properties

Extensive data about soil properties collected during

the soil survey are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of samples selected from representative soil profiles in the field.

When he makes soil borings during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in-place under the existing soil moisture conditions. He records the root depth of existing plants; determines soil pH, or reaction; and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties, especially properties that cannot be estimated accurately by field observation, and to characterize key soils. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many of the soil series are available from nearby areas.

Listed in tables in this section are estimated ranges in engineering properties and classifications and in physical and chemical properties for each major horizon of each soil in the survey area. These estimates are based on summaries of available field and laboratory data. Also, pertinent soil and water features, engineering test data, and data obtained from laboratory analyses, both physical and chemical, are presented.

Engineering Properties

Table 12 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

To a depth of 5 or 6 feet, most soils have horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties of each horizon is given for each soil series in the sections "Descriptions of the Soils" and "Factors of Soil Formation."

Texture is described in table 12 in standard terms used by the United States Department of Agriculture (USDA). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified soil classification system (*3*) and the American Association of State Highway and Transportation Officials classification system (AASHTO) (*2*). In table 12 soils in the survey area are classified according to both systems.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example CL–ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups, ranging from A–1 through A–7, on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A–1 are coarse grained and low in content of fines. At the other extreme, in group A–7, are fine-grained soils. Highly organic soils are classified as A–8 on the basis of visual inspection.

If laboratory data are available, the A–1, A–2, and A–7 groups are further classified as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or more for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 15. The estimated classification, without group index numbers, is given in table 12. Also in table 12 are estimated percentages, by weight, of cobbles or the rock fragments more than 3 inches in diameter. These estimates are determined largely by observing the volume percentage in the field and then converting it, by formula, to a weight percentage.

The percentage of soil material less than 3 inches in diameter that passes each of four standard sieves is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil. These indexes are used in both the Unified and the AASHTO classification systems. They are also used as indicators in making general predictions of soil behavior.

Ranges in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and Chemical Properties

Table 13 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observation and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in

TABLE 12.—*Engineering properties and classifications*

[The symbol < means less than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Hickory: 8F2.	0–5	Loam	CL–ML, CL	A–6, A–4	0–5	95–100	90–100	90–100	85–95	20–35	5–15
	5–60	Clay loam	CL	A–6, A–7	0–5	95–100	90–100	80–95	75–90	30–50	15–30
Tama: 36B, 36C2.	0–11	Silt loam	ML, CL, OL	A–6, A–7	0	100	100	100	95–100	35–50	10–20
	11–40	Silty clay loam	CL	A–7	0	100	100	100	95–100	40–50	15–25
	40–60	Silty clay loam, silt loam.	CL	A–6, A–7	0	100	100	100	95–100	35–45	15–25
Worthen: 37B.	0–21	Silt loam	CL	A–4, A–6	0	100	100	95–100	80–100	25–40	7–21
	21–60	Silt loam	CL	A–4, A–6	0	100	100	95–100	80–100	25–40	7–21
Muscatine: 41A, [1] U41B.	0–16	Silt loam	CL, CL–ML	A–6, A–4	0	100	100	100	95–100	25–40	5–15
	16–44	Silty clay loam	CL	A–7	0	100	100	100	95–100	40–50	20–30
	44–60	Silt loam	CL	A–6, A–7	0	100	100	100	95–100	35–45	15–25
Herrick: 46.	0–15	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	95–100	90–100	30–40	5–15
	15–56	Silty clay loam, silty clay.	CH	A–7	0	100	100	95–100	90–100	50–70	25–40
	56–60	Silt loam, loam	CL	A–6	0	100	100	95–100	90–100	30–40	10–20
Ebbert: 48.	0–16	Silt loam	ML, CL	A–6	0	100	97–100	95–100	85–95	30–40	10–15
	16–47	Silty clay loam	CH, CL	A–7	0	100	100	95–100	85–95	45–55	25–30
	47–60	Silty clay loam, clay loam, loam.	CL	A–7, A–6	0	100	95–100	95–100	80–90	40–50	20–30
Virden: 50.	0–17	Silt loam	CL	A–7, A–6	0	100	100	98–100	95–100	39–50	18–29
	17–33	Silty clay, silty clay loam.	CH, CL	A–7	0	100	100	98–100	95–100	47–66	27–48
	33–60	Silty clay loam, silt loam.	CL, CH	A–7, A–6	0	100	100	98–100	90–100	39–58	17–35
Atterberry: 61A.	0–19	Silt loam	CL–ML,CL	A–4, A–6	0	100	100	95–100	95–100	25–40	5–15
	19–48	Silty clay loam	CL, CH	A–7	0	100	100	95–100	95–100	40–55	20–30
	48–60	Silt loam	CL	A–6, A–4	0	100	100	95–100	95–100	35–40	10–20
Sable: 68.	0–15	Silty clay loam	CL, OH, CH	A–7	0	100	100	98–100	95–100	41–65	15–35
	15–45	Silty clay loam, silt loam.	CL, CH	A–7	0	100	100	98–100	95–100	41–55	20–35
	45–60	Silt loam	CL	A–6, A–4	0	100	100	98–100	95–100	30–40	10–30
Beaucoup: 70.	0–18	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	85–100	30–45	15–25
	18–42	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	85–100	30–45	15–30
	42–60	Stratified very fine sandy loam to silty clay loam.	CL, ML	A–6, A–7, A–4	0	100	100	90–100	65–95	25–45	5–30
Darwin: 71, [1] U71.	0–60	Silty clay	CH	A–7	0	100	100	100	95–100	50–85	30–55
Darwin variant: V71.	0–27	Silty clay	CH	A–7	0	100	100	95–100	90–100	50–80	30–55
	27–36	Silty clay loam	CL, CH	A–7	0	100	100	95–100	90–100	40–60	20–35
	36–60	Very fine sand, fine sand, sand.	SM, SW–SM, SP–SM	A–2, A–1, A–3	0	100	60–90	45–70	8–35	<20	[2] NP-3

Otter: 76.	0–46	Silt loam	CL	A–6, A–7	0	100	98–100	90–100	80–100	30–45	10–20
	46–60	Stratified silt loam to sandy loam.	CL, ML, SM, SC	A–4, A–6	0	90–100	80–100	55–95	45–85	20–35	NP–20
Littleton: 81A.	0–26	Silt loam	ML, CL	A–4, A–6	0	100	100	98–100	90–100	29–40	8–19
	26–60	Silt loam	CL, ML	A–4, A–6	0	100	100	98–100	80–100	23–40	7–21
Okaw: 84.	0–4	Silt loam	CL, ML	A–4, A–6	0	100	100	95–100	90–100	20–35	5–15
	4–74	Silty clay, silty clay loam, clay.	CH, CL	A–7	0	100	95–100	95–100	90–100	45–80	30–55
Bonnie: 108.	0–3	Silt loam	ML, CL	A–4, A–6	0	100	100	95–100	90–100	27–34	8–12
	3–60	Silt loam	ML, CL	A–4, A–6	0	100	100	95–100	90–100	27–34	8–12
Shiloh: 138.	0–14	Silty clay loam, silty clay.	CL, CH	A–7	0	100	100	98–100	90–100	43–55	20–32
	14–54	Silty clay, silty clay loam, clay.	CL, CH	A–7	0	100	100	98–100	90–100	41–56	19–34
	54–60	Silty clay loam, silty clay.	CL	A–7, A–6	0	100	100	95–100	90–100	36–47	18–29
Onarga: 150B.	0–19	Fine sandy loam	SC, SM	A–2, A–4, A–6	0	100	100	75–95	25–50	5–28	NP–12
	19–45	Fine sandy loam, loam, sandy clay loam.	SC, CL, SM–SC, CL–ML	A–4, A–6	0	95–100	95–100	75–95	36–60	19–32	5–14
	45–60	Stratified sand to sandy loam.	SM	A–2, A–4	0	85–100	80–100	70–95	12–50	<20	NP–6
Gorham: 162.	0–14	Silty clay loam	CL	A–6, A–7	0	100	95–100	90–100	70–90	35–50	15–25
	14–32	Silty clay loam, silty clay, clay loam.	CL	A–6, A–7	0	100	95–100	90–100	75–90	35–50	15–30
	32–60	Stratified sandy clay loam to sand.	SM, SP–SM	A–2, A–4	0	100	65–90	55–80	10–50	<30	NP–10
Weir: 165.	0–17	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	95–100	90–100	23–35	6–17
	17–42	Silty clay loam	CL	A–7, A–6	0	100	100	95–100	90–100	35–46	15–29
	42–60	Silt loam	CL	A–4, A–6	0	100	100	95–100	90–100	22–30	9–16
Dupo: 180.	0–10	Silt loam	ML, CL	A–4, A–6	0	100	100	100	95–100	20–35	1–15
	10–36	Silt loam	ML, CL	A–4, A–6	0	100	100	100	95–100	20–35	2–20
	36–60	Silty clay, clay, silty clay loam.	CL, CH	A–7, A–6	0	100	100	100	98–100	35–50	15–30
Fayette:											
280B, 280B2, 280C2, 280D2, 280E, 280G, [1] U280B, [1] U280C, [1] U280E.	0–10	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	100	95–100	25–35	5–15
	10–41	Silty clay loam	CL	A–7, A–6	0	100	100	100	95–100	35–45	15–25
	41–60	Silt loam	CL	A–6	0	100	100	100	95–100	30–40	10–20
280B3, 280C3, 280D3, 280E3.	0–10	Silty clay loam	CL	A–7, A–6	0	100	100	100	95–100	35–45	15–25
	10–41	Silty clay loam	CL	A–7, A–6	0	100	100	100	95–100	35–45	15–25
	41–60	Silt loam	CL	A–6	0	100	100	100	95–100	30–40	10–20
Landes: 304B.	0–13	Fine sandy loam	SM, ML	A–4	0	100	95–100	85–95	36–70	25–40	NP–10
	13–60	Stratified fine sand to silt loam.	SM, ML, SC, SW–SM	A–2, A–4, A–3	0	100	95–100	60–95	3–70	<30	NP–10

TABLE 12.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Alford:											
308B, 308B2, 308C2, 308D2.	0–18	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
308C3, 308F3, H308C, H308D, H308F.	0–18	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
Haymond: 331.	0–8	Silt loam	CL, ML	A–4	0	100	100	90–100	80–90	27–36	4–10
	8–60	Silt loam	CL, ML	A–4	0	100	100	90–100	80–90	27–36	4–10
Wakeland: 333.	0–14	Silt loam	CL, ML	A–4	0	100	100	90–100	80–90	27–36	4–10
	14–60	Silt loam	CL, ML	A–4	0	100	100	90–100	80–90	27–36	4–10
Hurst:	0–12	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	95–100	90–100	24–35	6–14
338A, 338B2.	12–60	Silty clay, clay, silty clay loam.	CH, CL	A–7	0	100	100	95–100	90–100	30–45	15–25
338C2.	0–12	Silty clay loam	CH, CL	A–7	0	100	100	95–100	90–100	43–63	22–43
	12–60	Silty clay, clay, silty clay loam.	CH, CL	A–7	0	100	100	95–100	90–100	30–45	15–25
S338B.	0–12	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	95–100	90–100	20–35	5–15
	12–40	Silty clay, clay, silty clay loam.	CH, CL	A–7	0	100	100	95–100	90–100	40–65	20–45
	40–60	Loamy sand, sand, sandy loam.	SM	A–2	0	100	90–100	40–80	15–35	<20	NP–3
Downs: 386B, 386C2.	0–16	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	100	95–100	25–35	5–15
	16–45	Silty clay loam	CL	A–7, A–6	0	100	100	100	95–100	35–45	15–25
	45–60	Silt loam	CL	A–6	0	100	100	100	95–100	30–40	11–20
Udifluvents, loamy: 407.	0–6	Stratified, silty clay, and coarse sand.	CL, ML, SM	A–7, A–6, A–2	0	100	90–100	60–100	20–95	5–50	NP–25
Karnak: 426.	0–5	Silty clay	CH, CL	A–7	0	100	100	100	95–100	45–80	25–34
	5–60	Silty clay, clay	CH, MH	A–7	0	100	100	100	95–100	50–80	23–38
Riley: 452, U452.	0–24	Silty clay loam, loam.	CL	A–6	0	100	100	95–100	80–100	28–40	15–21
	24–60	Loamy fine sand, sand.	SM, SM–SC	A–2, A–4	0	100	100	90–100	20–50	<25	NP–7
Iva: 454A, 454B, 454B2.	0–14	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–35	5–15
	14–44	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	80–100	35–50	15–30
	44–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–90	25–35	5–15

Piasa: 474.	0–9	Silt loam	CL–ML, CL	A–6, A–7	0	100	95–100	95–100	90–100	30–45	10–20
	9–43	Silty clay loam, silty clay.	CL, CH	A–7	0	100	95–100	95–100	95–100	45–65	25–40
	43–60	Silt loam	CL	A–7, A–6	0	100	95–100	95–100	90–100	35–50	14–27
Urban land: 533.											
Martinsville: 570B.	0–12	Loam, silt loam	CL, CL–ML	A–4, A–6	0	100	90–100	80–100	60–90	22–33	4–12
	12–32	Clay loam, silty clay loam, sandy clay loam.	CL	A–4, A–6	0	100	90–100	65–90	40–90	20–35	8–17
	32–42	Sandy loam, sandy clay loam, loam.	SM	A–2–4, A–4	0	100	90–100	60–80	30–60	30–40	2–8
	42–60	Stratified sand to sandy clay loam.	CL, SC, CL–ML	A–4	0	95–100	85–100	80–95	40–60	5–21	4–9
Parkville: 619.	0–15	Silty clay	CL, CH	A–6, A–7	0	100	100	95–100	90–100	35–60	15–35
	15–60	Stratified fine sandy loam to silty clay loam.	ML, CL	A–4	0	100	100	85–100	60–90	20–35	NP–15
Darmstadt: 620A, 620B2.	0–11	Silt loam	CL	A–6, A–7	0	98–100	95–100	95–100	75–100	25–44	12–20
	11–39	Silty clay loam, silty clay.	CL, CH	A–7	0	100	98–100	95–99	90–98	40–62	20–38
	39–62	Silt loam, silty clay loam.	CL	A–6, A–7	0	95–100	95–100	90–100	80–98	29–49	13–28
620C3.	0–11	Silty clay loam	CL, CH	A–7	0	98–100	95–100	95–100	90–98	40–62	20–38
	11–39	Silty clay loam, silty clay.	CL, CH	A–7	0	100	98–100	95–99	90–98	40–62	20–38
	39–62	Silt loam, silty clay loam.	CL	A–6, A–7	0	95–100	95–100	90–100	80–98	29–49	13–28
Orthents:											
801C, 801G.	0–60	Silt loam Silty clay loam	ML, CL	A–7, A–6, A–4	0–15	100	100	90–100	80–100	25–45	8–18
802.	0–60	Sandy loam	SM	A–2, A–4	0	100	90–100	70–100	25–95	10–45	NP–20
Alford:											
[1]922C3:											
Alford part.	0–18	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
Hurst part.	0–12	Silty clay loam	CH, CL	A–7	0	100	100	95–100	90–100	43–63	22–43
	12–60	Silty clay, clay, silty clay loam.	CH, CL	A–7	0	100	100	95–100	90–100	30–45	15–25
[1]922D3:											
Alford part.	0–18	Silty clay loam	CL	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
Hurst part.	0–12	Silty clay loam	CH, CL	A–7	0	100	100	95–100	90–100	43–63	22–43
	12–60	Silty clay, clay, silty clay loam.	CH, CL	A–7	0	100	100	95–100	90–100	30–45	15–25

TABLE 12.—*Engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Sylvan:											
[1] 962E3:											
Sylvan part.	0–8	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	100	95–100	25–35	5–15
	8–22	Silty clay loam	CL	A–6, A–7	0	100	100	100	95–100	35–50	20–30
	22–60	Silt loam	CL, CL–ML	A–7, A–6	0	100	100	95–100	95–100	20–40	5–20
Bold part.	0–60	Silt loam	ML, CL	A–4, A–6	0	100	100	100	90–100	20–35	5–15
[1] 962G:											
Sylvan part.	0–8	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	100	95–100	25–35	5–15
	8–22	Silty clay loam	CL	A–6, A–7	0	100	100	100	95–100	35–50	20–30
	22–60	Silt loam	CL, CL–ML	A–7, A–6	0	100	100	95–100	95–100	20–40	5–20
Bold part.	0–60	Silt loam	ML, CL	A–4, A–6	0	100	100	100	90–100	20–35	5–15
[1] U962F:											
Sylvan part.	0–8	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	100	95–100	25–35	5–15
	8–22	Silty clay loam	CL	A–6, A–7	0	100	100	100	95–100	35–50	20–30
	22–60	Silt loam	CL, CL–ML	A–7, A–6	0	100	100	95–100	95–100	20–40	5–20
Bold part.	0–60	Silt loam	ML, CL	A–4, A–6	0	100	100	100	90–100	20–35	5–15
Piasa:											
[1] 995:											
Piasa part.	0–9	Silt loam	CL–ML, CL	A–6, A–7	0	100	95–100	95–100	90–100	30–45	10–20
	9–43	Silty clay loam, silty clay.	CL, CH	A–7	0	100	95–100	95–100	95–100	45–65	25–40
	43–60	Silt loam	CL	A–7, A–6	0	100	95–100	95–100	90–100	35–50	14–27
Herrick part.	0–15	Silt loam	CL–ML, CL	A–4, A–6	0	100	100	95–100	90–100	30–40	5–15
	15–56	Silty clay loam, silty clay.	CH	A–7	0	100	100	95–100	90–100	50–70	25–40
	56–60	Silt loam, loam	CL	A–6	0	100	100	95–100	90–100	30–40	10–20
Alford:											
[1] 999E3:											
Alford part.	0–18	Silty clay loam	CL, CL–ML	A–7, A–6	0	100	100	90–100	80–100	30–50	15–30
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
Hickory part.	0–5	Clay loam	CL	A–6, A–7	0–5	95–100	90–100	80–95	75–90	30–50	15–30
	5–60	Clay loam	CL	A–6, A–7	0–5	95–100	90–100	80–95	75–90	30–50	15–30
[1] 999F3:											
Alford part.	0–18	Silty clay loam	CL, CL–ML	A–7, A–6	0	100	100	90–100	80–100	30–50	15–30
	18–58	Silty clay loam	CL, CL–ML	A–6, A–7	0	100	100	90–100	80–100	30–50	15–30
	58–60	Silt loam	CL, CL–ML	A–4, A–6	0	100	100	90–100	70–100	25–40	5–15
Hickory part.	0–5	Clay loam	CL	A–6, A–7	0–5	95–100	90–100	80–95	75–90	30–50	15–30
	5–60	Clay loam	CL	A–6, A–7	0–5	95–100	90–100	80–95	75–90	30–50	15–30

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2] Nonplastic

the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract in millimhos per centimeter at 25° C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is largely affected by the quality of the irrigation water and the irrigation practices. Hence, the salinity of individual fields can differ greatly from the estimate given in table 13. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 13, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Taking protective measures for steel or using more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Erosion factors are used in an equation that predicts the amount of erosion resulting from certain land treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to detachment and transport by rainfall. Soils having the highest K values in table 13 are the most erodible. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or wind, that may occur without reducing crop production or environmental quality.

Wind erodibility groups are used to predict the susceptibility of soils to blowing and to predict the amount of soil that will be lost by blowing. The groups consist of soils that are similar in properties that affect soil blowing, principally those that determine the stability of aggregates that resist breakdown by tillage and abrasion by wind. Among properties of soils that affect their placement in wind erodibility groups are texture, organic-matter content, content of calcium carbonate, soil moisture, mineralogical composition, and susceptibility to frost action.

Soil and Water Features

Features that relate to runoff or infiltration of water, to flooding, to grading and excavation, and to subsidence and frost action of each soil are indicated in table 14. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table, by the presence of bedrock or a cemented pan in the upper 5 or 6 feet of the soil, by subsidence, or by frost action.

Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence the minimum rate of infiltration into the bare soil after prolonged wetting are depth to a water table, water intake rate and permeability after prolonged wetting, and depth to layers of slowly or very slowly permeable soil.

Flooding is rated in general terms that describe the frequency, duration, and period of the year when flooding is most likely to occur. The ratings are based on evidence of the effects of flooding in the soil profile, namely thin strata of gravel, sand, silt or, in places, clay deposited by floodwater; irregular decrease in organic-matter content as depth increases; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding; local information about floodwater heights and the extent of flooding; and local knowledge that relates the unique landscape position of each soil to historic floods. Most soils in low positions on the landscape where flooding is likely to occur are classified as fluvents at the suborder level or as fluventic subgroups; classification of the soils is described in the section "Classification of the Soils."

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

A seasonal high water table is the highest level of

TABLE 13.—*Physical and chemical properties of soils*

[Dashes indicate data were not available. The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Hickory: 8F2.	0–5	0.6–2.0	0.20–0.22	4.5–6.0	<2	Low	Low	High	0.32	5–4	6
	5–60	0.6–2.0	0.15–0.19	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32		
Tama: 36B, 36C2.	0–11	0.6–2.0	0.22–0.24	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32	5	7
	11–40	0.6–2.0	0.18–0.20	5.1–5.5	<2	Moderate	Moderate	Moderate	0.43		
	40–60	0.6–2.0	0.18–0.20	5.6–6.0	<2	Moderate	Moderate	Moderate	0.43		
Worthen: 37B.	0–21	0.6–2.0	0.22–0.24	6.1–7.3	<2	Low	Low	Low	0.32	5–4	6
	21–60	0.6–2.0	0.20–0.22	6.1–7.8	<2	Low	Low	Low	0.43		
Muscatine: 41A, [1] U41B.	0–16	0.6–2.0	0.22–0.24	5.1–6.0	<2	Moderate	High	Moderate	0.28	5	6
	16–44	0.6–2.0	0.18–0.20	5.1–7.3	<2	Moderate	High	Moderate	0.43		
	44–60	0.6–2.0	0.18–0.20	7.4–7.8	<2	Moderate	High	Moderate	0.43		
Herrick: 46.	0–15	0.6–2.0	0.22–0.24	5.1–6.0	<2	Moderate	High	Moderate	0.32	5–4	6
	15–56	0.2–0.6	0.18–0.20	5.1–6.0	<2	High	High	Moderate	0.43		
	56–60	0.2–0.6	0.17–0.22	5.6–8.4	<2	Moderate	High	Low	0.43		
Ebbert: 48.	0–16	0.2–0.6	0.22–0.24	5.1–6.5	<2	Low	High	Moderate			6
	16–47	0.06–0.2	0.18–0.20	5.6–6.0	<2	Moderate	High	Moderate			
	47–60	0.06–0.2	0.14–0.20	6.1–6.5	<2	Moderate	High	Low			
Virden: 50.	0–17	0.6–2.0	0.21–0.24	5.6–6.5	<2	High	High	Moderate			4
	17–33	0.2–0.6	0.11–0.20	5.6–6.5	<2	High	High	Moderate			
	33–60	0.2–0.6	0.18–0.22	6.6–8.4	<2	High	High	Low			
Atterberry: 61A.	0–19	0.6–2.0	0.22–0.24	5.6–6.5	<2	Low	High	Moderate	0.32	5–4	6
	19–48	0.2–2.0	0.18–0.20	5.1–6.0	<2	Moderate	High	Moderate	0.43		
	48–60	0.6–2.0	0.20–0.22	6.1–7.8	<2	Low	High	Low	0.43		
Sable: 68.	0–15	0.6–2.0	0.22–0.24	5.6–7.3	<2	Moderate	High	Moderate			4
	15–45	0.6–2.0	0.18–0.20	6.1–7.8	<2	Moderate	High	Low			
	45–60	0.2–2.0	0.20–0.22	6.6–7.8	<2	Low	High	Low			
Beaucoup: 70.	0–18	0.6–2.0	0.21–0.23	6.1–7.8	<2	Moderate	High	Low			7
	18–42	0.6–2.0	0.18–0.20	6.1–7.8	<2	Moderate	High	Low			
	42–60	0.6–2.0	0.18–0.22	7.4–7.8	<2	Moderate	High	Low			
Darwin: 71, [1] U71.	0–60	<0.06	0.11–0.14	6.1–7.8	<2	Very high	High	Low			4
Darwin variant: V71.	0–27	<0.06	0.11–0.14	6.1–7.8	<2	High	High	Low			4
	27–36	<0.06	0.18–0.20	6.1–7.8	<2	High	High	Low			
	36–60	6.0–20	0.05–0.10	6.1–8.4	<2	Low	High	Moderate			
Otter: 76.	0–46	0.6–2.0	0.22–0.24	6.1–7.8	<2	Low	High	Low			6
	46–60	0.6–2.0	0.12–0.21	6.6–8.4	<2	Low	High	Low			
Littleton: 81A.	0–26	0.6–2.0	0.22–0.24	6.1–7.3	<2	Low	High	Low	0.32	5	6
	26–60	0.6–2.0	0.20–0.22	6.1–7.8	<2	Low	High	Low	0.43		

Okaw: 84.	0–4	0.2–0.6	0.22–0.24	4.5–6.5	<2	Low	High	High	0.43	3–2	6
	4–74	<0.06	0.09–0.20	3.6–7.3	<2	High	High	High	0.32		
Bonnie: 108.	0–3	0.6–2.0	0.22–0.24	6.6–7.3	<2	Low	High	Low			6
	3–60	0.06–2.0	0.20–0.22	4.5–5.5	<2	Low	High	High			
Shiloh: 138.	0–14	0.2–0.6	0.12–0.21	6.1–7.3	<2	High	High	Low			4
	14–54	0.06–0.2	0.09–0.18	6.6–7.8	<2	High	High	Low			
	54–60	0.06–0.2	0.18–0.20	7.9–8.4	<2	High	High	Low			
Onarga: 150B.	0–19	0.6–6.0	0.13–0.22	5.6–6.5	<2	Low	Low	Moderate	0.20	4–3	3
	19–45	0.6–6.0	0.15–0.19	5.1–6.5	<2	Low	Low	High	0.20		
	45–60	6.0–20	0.05–0.13	5.1–7.8	<2	Low	Low	High	0.15		
Gorham: 162.	0–14	0.2–0.6	0.21–0.23	6.1–7.8	<2	Moderate	High	Low			4
	14–32	0.2–0.6	0.13–0.20	6.1–7.8	<2	Moderate	High	Low			
	32–60	0.6–20	0.05–0.13	6.1–7.8	<2	Very low	High	Low			
Weir: 165.	0–17	0.2–0.6	0.22–0.24	4.5–6.5	<2	Low	High	High			6
	17–42	<0.06	0.18–0.20	4.5–5.5	<2	High	High	High			
	42–60	0.06–0.2	0.20–0.22	5.6–7.3	<2	Low	High	Moderate			
Dupo: 180.	0–10	0.6–2.0	0.22–0.24	5.6–7.3	<2	Low	High	Moderate			5
	10–36	0.2–0.6	0.20–0.22	5.6–8.4	<2	Low	High	Moderate			
	36–60	0.06–0.2	0.08–0.19	6.6–7.8	<2	High	High	Low			
Fayette:											
280B3, 280C3, 280D3, 280E3.	0–10	0.6–2.0	0.18–0.20	4.5–5.5	<2	Moderate	Moderate	Moderate	0.37	4	6
	10–41	0.6–2.0	0.18–0.20	4.5–5.5	<2	Moderate	Moderate	Moderate	0.37		
	41–60	0.6–2.0	0.18–0.20	5.1–5.5	<2	Moderate	Moderate	Moderate	0.37		
280B, 280B2, 280C2, 280D2, 280E, 280G, [1] U280B, [1] U280C, [1] U280E.	0–10	2.0–6.0	0.20–0.22	5.1–6.0	<2	Low	Moderate	Moderate	0.37	5	6
	10–41	0.6–2.0	0.18–0.20	4.5–5.5	<2	Moderate	Moderate	Moderate	0.37		
	41–60	0.6–2.0	0.18–0.20	5.1–5.5	<2	Moderate	Moderate	Moderate	0.37		
Landes: 304B.	0–13	2.0–6.0	0.16–0.18	6.1–8.4	<2	Low	Low	Low	0.20	5	3
	13–60	6.0–20	0.05–0.20	6.1–8.4	<2	Very low	Low	Low	0.20		
Alford:											
308B, 308B2, 308C2, 308D2.	0–18	0.6–2.0	0.22–0.24	5.1–7.3	<2	Low	Moderate	Moderate	0.37	5–4	5
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		
308C3, 308F3, H308C, H308D, H308F.	0–18	0.6–2.0	0.21–0.23	4.5–6.5	<2	Low	Moderate	High	0.37	5–4	7
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		
Haymond: 331.	0–8	0.6–2.0	0.22–0.24	6.1–6.5	<2	Low	Low	Low			5
	8–60	0.6–2.0	0.20–0.22	6.1–6.5	<2	Low	Low	Low			
Wakeland: 333.	0–14	0.6–2.0	0.22–0.24	6.6–7.3	<2	Low	High	Low			5
	14–60	0.6–2.0	0.20–0.22	6.6–7.3	<2	Low	High	Low			
Hurst:											
338A, 338B2.	0–12	0.2–0.6	0.22–0.24	4.5–5.5	<2	Moderate	High	High	0.43	3–2	6
	12–60	<0.06	0.10–0.20	4.5–7.3	<2	High	High	High	0.32		
338C2.	0–12	0.2–0.6	0.20–0.22	4.5–5.5	<2	High	High	High	0.43	3–2	
	12–60	<0.06	0.10–0.20	4.5–7.3	<2	High	High	High	0.32		
S338B.	0–12	0.2–0.6	0.22–0.24	4.5–5.5	<2	Moderate	High	High	0.43	3–2	6
	12–40	<0.06	0.10–0.20	4.5–7.3	<2	High	High	High	0.32		
	40–60	2.0–6.0	0.05–0.13	4.5–7.3	<2	Low	Low	High	0.17		
Downs: 386B, 386C2.	0–16	2.0–6.0	0.21–0.23	5.1–6.5	<2	Low	Moderate	Moderate	0.32	5–4	6
	16–45	0.6–2.0	0.18–0.20	5.1–5.5	<2	Moderate	Moderate	Moderate	0.43		
	45–60	0.6–2.0	0.18–0.20	5.6–6.0	<2	Moderate	Moderate	Moderate	0.43		

TABLE 13.—*Physical and chemical properties of soils*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors		Wind erodibility group
							Uncoated steel	Concrete	K	T	
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*						
Udifluvents, loamy: 407.	0–6	0.2–20	0.03–0.17	6.6–8.4	<2		High	Low			2
Karnak: 426.	0–5	0.06–0.2	0.11–0.14	5.6–6.0	<2	Very high	High	Moderate			4
	5–60	<0.2	0.09–0.13	5.6–7.3	<2	Very high	High	Moderate			
Riley: 452, U452.	0–24	0.6–2.0	0.17–0.23	6.1–7.8	<2	Moderate	High	Low			6
	24–60	6.0–20	0.05–0.10	6.6–8.4	<2	Very low	Low	Low			
Iva: 454A, 454B, 454B2.	0–14	0.6–2.0	0.22–0.24	5.1–7.3	<2	Low	High	Moderate	0.43	4–3	5
	14–44	0.06–0.2	0.18–0.20	5.1–6.5	<2	Low	High	Moderate	0.43		
	44–60	0.6–2.0	0.20–0.22	5.6–6.5	<2	Low	High	Moderate	0.43		
Piasa: 474.	0–9	0.2–0.6	0.22–0.24	5.1–7.3	<2	Moderate	High	Moderate			6
	9–43	<0.2	0.09–0.10	7.9–9.0	>8	High	High	High			
	43–60	0.06–0.2	0.10–0.12	7.4–8.4	2–16	Moderate	High	Low			
Urban land: 533.											
Martinsville: 570B.	0–12	0.6–2.0	0.20–0.24	5.6–7.3	<2	Low	Moderate	Moderate	0.37	4–3	5
	12–32	0.6–2.0	0.17–0.20	5.1–6.0	<2	Moderate	Moderate	Moderate	0.37		
	32–42	0.6–2.0	0.12–0.14	5.6–6.5	<2	Low	Low	Moderate	0.24		
	42–60	2.0–6.0	0.19–0.21	7.4–8.4	<2	Low	Low	Low	0.24		
Parkville: 619.	0–15	0.06–0.2	0.12–0.21	6.6–8.4	<2	Moderate	Moderate	Low			4
	15–60	0.06–2.0	0.18–0.22	7.4–8.4	<2	Low	Moderate	Low			
Darmstadt:											
620A, 620B2.	0–11	0.06–0.2	0.22–0.24	5.1–7.3	<2	Low	High	Moderate	0.43	3	6
	11–39	<0.2	0.09–0.10	4.5–7.8	10–20	Moderate	High	High	0.43		
	39–62	<0.2	0.10–0.11	7.4–9.0	3–20	Low	High	Low	0.43		
620C3.	0–11	<0.2	0.09–0.10	4.5–7.8	10–20	Moderate	High	High	0.43	2	6
	11–39	<0.2	0.09–0.10	4.5–7.8	10–20	Moderate	High	High	0.43		
	39–62	<0.2	0.10–0.11	7.4–9.0	3–20	Low	High	Low	0.43		
Orthents:											
801C, 801G.	0–60	0.06–0.6	0.14–0.22	5.1–7.3	<2	Moderate	Moderate	Moderate	0.43	5	6
802.	0–60	0.2–6.0	0.05–0.20	6.1–8.4	<2	Low	Low	Low	0.43	5	6
Alford:											
[1] 922C3:											
Alford part.	0–18	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	High	0.37	4	7
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		
Hurst part.	0–12	<0.06	0.10–0.20	4.5–7.3	<2	High	High	High	0.32	2	
	12–60	<0.06	0.10–0.20	4.5–7.3	<2	High	High	High	0.32		
[1] 922D3:											
Alford part.	0–18	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	High	0.37	4	7
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		

Sylvan:											
[1]962E3:											
Sylvan part.	0–8	0.6–2.0	0.22–0.24	6.1–7.3	<2	Low	Low	Low	0.37	5–4	6
	8–22	0.6–2.0	0.18–0.20	5.1–7.3	<2	Moderate	Moderate	Moderate	0.37		
	22–60	0.6–2.0	0.20–0.22	6.6–8.4	<2	Moderate	Low	Low	0.37		
Bold part.	0–60	0.6–2.0	0.20–0.24	7.4–8.4	<2	Low	Low	Low	0.43	5–4	4L
[1]962G:											
Sylvan part.	0–8	0.6–2.0	0.22–0.24	6.1–7.3	<2	Low	Low	Low	0.37	5–4	6
	8–22	0.6–2.0	0.18–0.20	5.1–7.3	<2	Moderate	Moderate	Moderate	0.37		
	22–60	0.6–2.0	0.20–0.22	6.6–8.4	<2	Moderate	Low	Low	0.37		
Bold part.	0–60	0.6–2.0	0.20–0.24	7.4–8.4	<2	Low	Low	Low	0.43	5–4	4L
[1]U962F:											
Sylvan part.	0–8	0.6–2.0	0.22–0.24	6.1–7.3	<2	Low	Low	Low	0.37	5–4	6
	8–22	0.6–2.0	0.18–0.20	5.1–7.3	<2	Moderate	Moderate	Moderate	0.37		
	22–60	0.6–2.0	0.20–0.22	6.6–8.4	<2	Moderate	Low	Low	0.37		
Bold part.	0–60	0.6–2.0	0.20–0.24	7.4–8.4	<2	Low	Low	Low	0.43	5–4	4L
Piasa:											
[1]995:											
Piasa part.	0–9	0.2–0.6	0.22–0.24	5.1–7.3	<2	Moderate	High	Moderate			6
	9–43	<0.2	0.09–0.10	7.9–9.0	>8	High	High	High			
	43–60	0.06–0.2	0.10–0.12	7.4–8.4	2–16	Moderate	High	Low			
Herrick part.	0–15	0.6–2.0	0.22–0.24	5.1–6.0	<2	Moderate	High	Moderate	0.32	5–4	6
	15–56	0.2–0.6	0.18–0.20	5.1–6.0	<2	High	High	Moderate	0.43		
	56–60	0.2–0.6	0.17–0.22	5.6–8.4	<2	Moderate	High	Low	0.43		
Alford:											
[1]999E3:											
Alford part.	0–18	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37	4	5
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		
Hickory part.	0–5	0.6–2.0	0.15–0.19	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32	4	6
	5–60	0.6–2.0	0.15–0.19	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32		
[1]999F3:											
Alford part.	0–18	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37	4	5
	18–58	0.6–2.0	0.18–0.20	4.5–6.5	<2	Low	Moderate	Moderate	0.37		
	58–60	0.6–2.0	0.20–0.22	5.6–7.3	<2	Low	Moderate	Moderate	0.37		
Hickory part.	0–5	0.6–2.0	0.15–0.19	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32	4	6
	5–60	0.6–2.0	0.15–0.19	5.1–5.5	<2	Moderate	Moderate	Moderate	0.32		

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 14.—*Soil and water features*

[Absence of an entry indicates the feature is not a concern. See "Water table" in the glossary for such terms as "apparent" and "perched." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			*In*		
Hickory: 8F2	C	None			>6.0			>60		Moderate.
Tama: 36B, 36C2	B	None			>6.0			>60		High.
Worthen: 37B	B	None			>6.0			>60		High.
Muscatine: 41A, [1] U41B	B	None			2.0–5.0	Apparent	Nov-Jun	>60		High.
Herrick: 46	C	None			1.0–3.0	Apparent	Mar-Jun	>60		High.
Ebbert: 48	C/D	Occasional	Brief	Mar-Jun	0–2.0	Apparent	Apr-Jul	>60		High.
Virden: 50	B/D	Occasional	Brief	Mar-Jun	0–2.0	Apparent	Mar-Jun	>60		High.
Atterberry: 61A	B	None			1.0–3.0	Apparent	Mar-Jun	>60		High.
Sable: 68	B/D	Occasional	Brief	Mar-Jun	0–2.0	Apparent	Mar-Jun	>60		High.
Beaucoup: 70	B/D	Frequent	Brief	Mar-Jun	0–2.0	Apparent	Mar-Jun	>60		High.
Darwin: 71, [1] U71	D	Frequent	Long	Mar-Jun	0–2.0	Apparent	Mar-Jun	>60		Moderate.
Darwin variant: V71	D	Common	Brief	Nov-Jun	0–2.0	Apparent	Nov-Jun	>60		Moderate.
Otter: 76	B/D	Frequent	Brief	Apr-Jun	0–2.0	Apparent	Apr-Jun	>60		High.
Littleton: 81A	B	None to rare			1.0–3.0	Apparent	Apr-Jun	>60		High.
Okaw: 84	D	Occasional	Brief	Apr-Jun	0–2.0	Apparent	Mar-Jun	>60		High.
Bonnie: 108	C/D	Frequent	Long	Mar-Jun	0–3.0	Apparent	Mar-Jun	>60		High.
Shiloh: 138	B/D	Frequent	Brief	Mar-Jun	0–2.0	Apparent	Mar-Jun	>60		High.
Onarga: 150B	B	None			>6.0			>60		Moderate.
Gorham: 162	B/D	Frequent	Brief	Mar-Jun	0–3.0	Apparent	Mar-Jun	>60		High.
Weir: 165	D	Occasional	Brief	Mar-Jun	0–2.0	Perched	Feb-Jun	>60		High.
Dupo: 180	C	Frequent	Long	Mar-Jun	1.0–3.0	Apparent	Mar-Jun	>60		High.
Fayette: 280B, 280B2, 280B3, 280C2, 280C3, 280D2, 280D3, 280E, 280E3, 280G, [1] U280B, [1] U280C, [1] U280E.	B	None			>6.0			>60		High.
Landes: 304B	B	Rare			3.0–6.0	Apparent	Mar-May	>60		Moderate.
Alford: 308B, 308B2, 308C2, 308C3, 308D2, 308F3, H308C, H308D, H308F.	B	None			>6.0			>60		High.
Haymond: 331	B	Frequent	Brief	Jan-May	>6.0			>60		High.
Wakeland: 333	B/D	Frequent	Brief	Jan-May	1.0–3.0	Apparent	Jan-Apr	>60		High.
Hurst: 338A, 338B2, 338C2, S338B	D	Rare			1.0–3.0	Apparent	Feb-Apr	>60		Moderate.
Downs: 386B, 386C2	B	None			>6.0			>60		High.
Udifluvents, loamy: 407	C	Frequent	Long	Feb-Jun	1.0–4.0	Apparent	Jan-Jun	>60		Moderate.
Karnak: 426	D	Frequent	Long	Mar-May	0–3.0	Apparent	Apr-Jun	>60		High.
Riley: 452, U452	C	Frequent	Brief	Apr-Jun	1.0–3.0	Apparent	Apr-Jun	>60		High.
Iva: 454A, 454B, 454B2	C	None			1.0–3.0	Apparent	Jan-Apr	>60		High.
Piasa: 474	D	None			0–2.0	Perched	Feb-May	>60		High.
Urban land: 533.										
Martinsville: 570B	B	None			>6.0			>60		Moderate.
Parkville: 619	C	Frequent	Brief	Nov-Jun	1.0–2.0	Perched	Nov-Apr	>60		Moderate.
Darmstadt: 620A, 620B2, 620C3	D	None			1.0–3.0	Perched	Feb-May	>60		High.
Orthents:										
801C, 801G	D	None			>6.0			>60		High.
802	C	None			>6.0			>60		Moderate.
Alford:										
[1] 922C3:										
Alford part	B	None			>6.0			>60		High.
Hurst part	D	Rare			1.0–3.0	Apparent	Feb-Apr	>60		Moderate.
[1] 922D3:										
Alford part	B	None			>6.0			>60		High.
Hurst part	D	Rare			1.0–3.0	Apparent	Feb-Apr	>60		Moderate.

Sylvan:										
[1]962E3:										
Sylvan part	B	None			>6.0			>60		High.
Bold part	B	None			>6.0			>60		High.
[1]962G:										
Sylvan part	B	None			>6.0			>60		High.
Bold part	B	None			>6.0			>60		High.
[1]U962F:										
Sylvan part	B	None			>6.0			>60		High.
Bold part	B	None			>6.0			>60		High.
Piasa:										
[1]995:										
Piasa part	D	None			0–2.0	Perched	Feb-May	>60		High.
Herrick part	C	None			1.0–3.0	Apparent	Mar-Jun	>60		High.
Alford:										
[1]999E3:										
Alford part	B	None			>6.0			>60		High.
Hickory part	C	None			>6.0			>60		Moderate.
[1]999F3:										
Alford part	B	None			>6.0			>60		High.
Hickory part	C	None			>6.0			>60		Moderate.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

saturated zone more than 6 inches thick in soils for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or the upper part of the ground water table; and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not to construct basements and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. The depth to bedrock, however, is generally more than 6 feet for all soils in St. Clair County. Because of this the figures for hardness of bedrock are not given in table 14. For many soils, a limited range in depth to bedrock is a part of the definition of the soil series. Depths are based on measurements made in many soil borings and on other observations during the soil mapping. The kind of bedrock and its relative hardness is related to ease of excavation. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200 horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action is defined as freezing temperatures in the soil and movement of soil moisture into the freezing zone, which causes the formation of ice lenses. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Engineering Test Data

Table 15 shows test data for samples of several kinds of soil in St. Clair County. The test results do not represent the entire range of characteristics of soils within the county, nor do they represent the entire range of characteristics of the soils tested. Nevertheless, the results can be used as a general guide in estimating properties of the other soils in the county.

Moisture-density data are obtained by compacting soil material at a successively higher moisture content. Assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. As a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Mechanical analysis refers to the measurement of the amounts of various size classes of soil grains (sand, silt, or clay) in a sample. Proportions of the size classes determine the textural class of the material. Names used by engineers for various size classes of particles differ from those used by soil scientists. For example, fine sand in engineering terminology consists of particles 0.42 to 0.74 millimeter in diameter, whereas fine sand as determined by the soil scientist consists of particles 0.10 to 0.25 millimeter in diameter.

The tests to determine liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic. As the moisture content is further increased, the material changes from a plastic to a liquid. The plastic limit is the moisture content at which the soil material changes from a semisolid to a plastic. The liquid limit is the moisture content at which the material changes from a plastic to a liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which soil material is plastic.

Classification of the Soils

This section describes the current system of classifying soils and classifies the soils of St. Clair County according to that system.

The system of soil classification used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available.[4]

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the bases for classification are the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other sciences that are related to soil science. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 16 the soils of the survey area are classified according to the system. Classes of the system are briefly discussed in the following paragraphs.

ORDER: Ten soils orders are recognized. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol.* An example is Entisol.

SUBORDER: Each order is divided into suborders primarily on the basis of properties that influence soil genesis and that are important to plant growth or that

[4] See the unpublished working document "Selected Chapters from the Unedited Text of the Soil Taxonomy" available in the SCS State Office, Champaign, Illinois.

were selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu,* meaning water, plus *ent,* from Entisol).

GREAT GROUP: Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. The name of a great group ends with the name of a suborder. A prefix added to the name suggests something about the properties of the soil. An example is Haplaquents (*Hapl,* meaning simple horizons, plus *aquent,* the suborder of Entisols that have an aquic moisture regime).

SUBGROUP: Each great group is divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. The names of subgroups are derived by placing one or more adjectives before the name of the great group. The adjective *Typic* is used for the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY: Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and have horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Formation of the Soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characteristics of a soil at any given time are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, mainly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil profile. It may be much or little, but some time is always required for differentiation of soil horizons. A long time generally is required for the development of distinct horizons.

The five factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent material [5]

The parent materials in St. Clair County are loess, clayey lacustrine material, and alluvium (fig. 15). About 73 percent of the soils formed entirely in windblown silt, or loess; about 5 percent formed in less than 60 inches of loess underlain by clayey material; about 20 percent formed in alluvium; and about 2 percent formed in clayey lacustrine material over glacial outwash material, but are not shown in figure 15.

Fayette, Alford, and Tama soils formed entirely in loess 60 inches thick or more; soils that formed in loess less than 60 inches thick have been classified in the Weir and Iva series or the Okaw and Hurst series, depending on dominant soil characteristics; Okaw and Hurst soils formed in clayey lacustrine material; and Wakeland and Darwin soils formed in alluvium.

The glaciers that covered most of North America also covered St. Clair County, and they affected the soils of the survey area through the deposition of loess derived from the Illinoian and Wisconsinan glacial materials (*7*). The loess is thickest near its major source, which, for St. Clair County, was the Mississippi and Missouri Rivers. The Kaskaskia River valley and Silver Creek also served as sources and influenced the distribution of the loess.

In those areas of St. Clair County that have loess, the deposits range in thickness from more than 100 feet along the bluffs adjacent to the American Bottoms to about 10 feet in the southeastern corner of the county. The loess or silty parent material consists of three stratigraphic units: Peoria Loess, Robein Silt, and Roxana Silt (*12*). From the surface downward, the first unit is Peoria Loess. It is buff colored, has low density, and is very permeable. The second unit is the Robein Silt, which is not always present. It has high organic-matter content, is very poorly drained, and generally acts as a water-collecting area. Other unnamed layers that are high in organic-matter content may be present within the Peoria Loess. The lowest unit of loess is Roxana Silt. It is pinkish, compact, and less permeable than Peoria Loess. Peoria Loess and Roxana Silt are Wisconsinan in age. Where Robein Silt is lacking, there

[5] DR. LEON R. FOLLMER, assistant geologist, Illinois State Geological Survey, and Dr. RONALD YARBROUGH, assistant professor, Earth Science and Planning, Southern Illinois University, Edwardsville, helped to prepare this section.

TABLE 15.—*Engineering*

[Tests made by Illinois Department of Transportation.[1] Absence of an entry

Soil name and location	Parent material	Depth	Moisture-density data[2]		Mechanical analysis[3]		
			Maximum dry density	Optimum moisture	Percentage less than 3 inches passing sieve—		
					¾ inches	⅜ inches	No. 4 (4.7 mm)
		Inches	*Pounds per cubic foot*	*Percent*			
Darmstadt silt loam:							
180 feet east and 55 feet north of southwest corner of sec. 12, T. 2 S., R. 8 W. (Modal)	Loess.	6–12	103	18			100
		24–34	104	22	100	99	98
		49–59	108	17			
Fayette silt loam:							
3,000 feet east and 1,650 feet south of northwest corner of sec. 34, T. 1 N., R. 8 W. (Modal)	Loess.	0–9	108	16			
		17–30	103	20			
		40–60	106	18			
Herrick silt loam:	Loess.	18–33	106	18			
2,800 feet north and 2,600 feet east of southwest corner of sec. 7, T. 2 S., R. 6 W. (Modal)		36–48	104	20		100	99
Okaw silt loam:	Alluvium.	2–6	100	21			
950 feet north and 2,200 feet west of southeast corner of sec. 30, R. 7 W., T. 2 S. (Modal)		9–33	88	30			
		33–50	91	28			
Piasa:	Loess.	12–25	105	20			
152 feet north and 120 feet east of southwest corner of sec. 7, T. 2 S., R. 7 W. (Modal)		30–50	103	19			100
Riley silty clay loam:	Alluvium.	0–12	104	19			
696,150 feet north and 489,525 feet east of State planes coordinates—Illinois west zone. T. 1 N., R. 10 W. (not surveyed) (Modal)		17–24	107	18			
		24–34	107	12			
Tama silt loam:	Loess.	0–11	106	17			
315 feet east and 63 feet south of center of sec. 16, T. 1 N., R. 7 W. (Modal)		16–31	102	21			
		49–63	107	19			
Weir silt loam:	Loess.	20–36	98	23			
2,592 feet east and 630 feet north of southwest corner of sec. 26 T. 1 N., R. 7 W. (Non-modal, clayey subsoil)		40–60	97	23			

[1] Report numbers omitted by test laboratory.

[2] Based on AASHTO Designation T 99–77, Method A (*2*).

[3] Mechanical analyses according to the AASHTO Designation T 88–57 (*2*). Results by this procedure may differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by hydrometer method, and the various grain-size fractions are calculated on the basis of all material up to and including that coarser than 3 inches in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from the calculation of grain-size fractions. The me-

is commonly a thin, distinct, gray layer at the point of contact between Peoria Loess and Roxana Silt. Where this contact point is exposed by valley entrenchment, it is commonly seepy and water flows during periods of heavy rain.

East of Dupo, a unique geologic condition has resulted in karst topography (see fig. 15). The karst area is characterized by rolling hills, circular depressions called sinkholes, and caves. Typically, it has a scarcity of streams that have a continuous surface flow. The geologic features contributing to the karst formation are as follows: the permeable loess; a thin, jointed layer of St. Louis Limestone beneath the loess; and a very thin deposit of Illinoian glacial drift. Presently, some surface water flows directly into the sinkholes and then into the underground cave-stream system (fig. 16).

test data

indicates that no determination was made or information does not apply]

Mechanical analysis [3]—Continued						Liquid limit [4]	Plasticity index [5]	Classification	
Percentage less than 3 inches passing sieve—Continued			Percentage smaller than—					AASHTO [6]	Unified [7]
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm				
						Percent			
98	95	92	86	18	13	30	7	A–4(6)	ML
97	95	93	91	39	30	65	44	A–7–6(45)	CH
100	100	99	92	23	19	39	19	A–6(20)	CL
----------	100	98	66	13	9	26	5	A–4(4)	CL–ML
----------	----------	100	93	34	29	47	25	A–7–6(28)	CL
----------	----------	100	91	28	23	41	20	A–7–6(22)	CL
100	99	98	94	38	31	49	32	A–7–6(34)	CL
98	96	94	87	40	30	49	26	A–7–6(27)	CL
100	97	92	87	32	22	35	12	A–6(11)	CL
100	99	97	92	66	56	60	36	A–7–6(40)	CH
----------	100	96	94	73	65	78	55	A–7–6(60)	CH
100	98	97	88	36	29	48	30	A–7–6(31)	CL
99	97	96	91	40	33	56	38	A–7–6(40)	CH
----------	100	94	62	29	21	41	19	A–7–6(19)	CL
----------	100	95	86	39	29	38	17	A–6(17)	CL
100	99	12	8	1	----------	----------	[8] NP	A–2–4(0)	SW–SM
100	99	98	89	20	15	28	6	A–4	CL–ML
100	99	99	90	34	28	43	20	A–7–6(22)	CL
100	99	98	91	22	18	38	16	A–6(17)	CL
100	99	99	84	39	34	56	37	A–7–6(41)	CH
----------	100	98	97	54	47	61	39	A–7–6(43)	CH

chanical analyses data used in this table are not suitable for use in naming textural classes of soil.

[4] Based on AASHTO Designation T 89–60 (*2*).

[5] Based on AASHTO Designation T 90–56 and AASHTO Designation T 91–54 (*2*).

[6] Based on AASHTO Designation M 145–49 (*2*).

[7] Based on ASTM Designation D 2487–66 T (*3*).

[8] NP means nonplastic.

The Alford soils that formed in thick loess deposits are dominant in this area. These soils are well drained and are moderately permeable.

About 40 percent of the soils of St. Clair County formed in loess made up of both Roxana and Peoria units and are underlain by stratified glacial deposits. The stratified glacial deposits generally consist of a clayey Sangamon soil (a Paleosol) formed in the upper part of the Pearl Formation, which is Illinoian in age (fig's. 17 and 18). This Paleosol is below the present soil and is less permeable. Some perching of water occurs on top of the Sangamon soil layer. The stratified materials of the Pearl Formation generally have strata of silty clay, silty clay loam, fine sand, and very fine sand, but as depth increases, coarse sand becomes dominant.

TABLE 16.—*Classification of the soils*

Soil name	Family or higher taxonomic class
Alford	Fine-silty, mixed, mesic Typic Hapludalfs.
Atterberry	Fine-silty, mixed, mesic Udollic Ochraqualfs.
Beaucoup	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls.
Bold	Coarse-silty, mixed (calcareous), mesic Typic Udorthents.
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents.
Darmstadt	Fine-silty, mixed, mesic Typic Natraqualfs.
Darwin	Fine, montmorillonitic, mesic Vertic Haplaquolls.
Darwin Variant	Clayey over loamy, montmorillonitic, mesic Vertic Haplaquolls.
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs.
Dupo	Coarse-silty over clayey, mixed, nonacid, mesic Aquic Udifluvents.
Ebbert	Fine-silty, mixed, mesic Argiaquic Argialbolls.
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs.
Gorham	Fine-silty, mixed, mesic Fluvaquentic Haplaquolls.
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents.
Herrick	Fine, montmorillonitic, mesic Aquic Argiudolls.
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs.
Hurst	Fine, montmorillonitic, mesic Aeric Ochraqualfs.
Iva	Fine-silty, mixed, mesic Aeric Ochraqualfs.
Karnak	Fine, montmorillonitic, nonacid, mesic Vertic Haplaquepts.
Landes	Coarse-loamy, mixed, mesic Fluventic Hapludolls.
Littleton	Fine-silty, mixed, mesic Cumulic Hapludolls.
Martinsville	Fine-loamy, mixed, mesic Typic Hapludalfs.
Muscatine	Fine-silty, mixed, mesic Aquic Hapludolls.
Okaw	Fine, montmorillonitic, mesic Typic Albaqualfs.
Onarga	Coarse-loamy, mixed, mesic Typic Argiudolls.
Orthents	Loamy, mixed, mesic Udorthents.
Otter	Fine-silty, mixed, mesic Cumulic Haplaquolls.
Parkville	Clayey over loamy, montmorillonitic, mesic Fluvaquentic Hapludolls.
Piasa	Fine, montmorillonitic, mesic Typic Natralbolls.
Riley	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Hapludolls.
Sable	Fine-silty, mixed, mesic Typic Haplaquolls.
Shiloh	Fine, montmorillonitic, mesic Cumulic Haplaquolls.
Sylvan	Fine-silty, mixed, mesic Typic Hapludalfs.
Tama	Fine-silty, mixed, mesic Typic Argiudolls.
Udifluvents, loamy	Loamy, mixed, nonacid, mesic Aquic Udifluvents.
Virden	Fine, montmorillonitic, mesic Typic Argiaquolls.
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents.
Weir	Fine, montmorillonitic, mesic Typic Ochraqualfs.
Worthen	Fine-silty, mixed, mesic Cumulic Hapludolls.

Among those soils that formed in loess over stratified glacial material are the somewhat poorly drained, slowly permeable Iva soils and the poorly drained, slowly permeable to very slowly permeable Weir soils, both of which formed under woodland, and the dark colored, somewhat poorly drained, moderately permeable Sable soils, both of which formed under grasses.

In addition to the stratified outwash deposits of the Pearl Formation, a large part of the county is underlain by glacial till of the Glassford Formation. It is also Illinoian in age. Both thick and thin deposits of Peoria Loess overlie the Glassford Formation.

The older Banner Formation of Kansan age glacial drift underlies the Illinoian outwash and till.

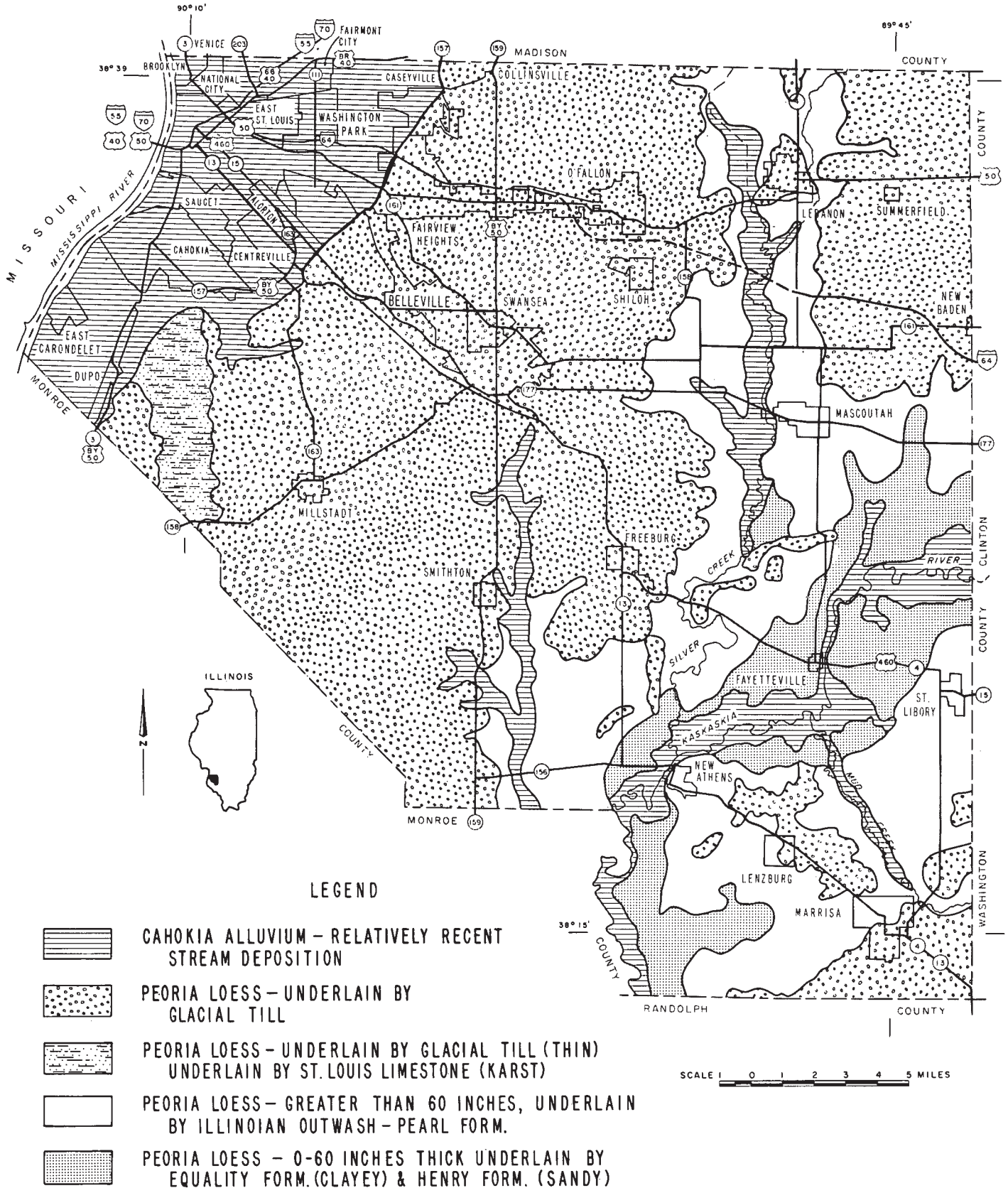
About 5 percent of the soils formed in loess less than 60 inches in depth and in the underlying clayey material of the Equality Formation. The silty material is thin enough so that the lower part of the solum formed both from the silty material and from the clayey material. These soils commonly are somewhat poorly drained and moderately slowly permeable. They have been classified with upland or terraced soils, depending on their dominant characteristics.

About 2 percent of the soils formed mainly in fine textured, or clayey, material of the Equality Formation. These soils are on low terraces along the Kaskaskia River and Silver Creek bottom lands. The Equity Formation consists of outwash sediment or lacustrine sediment of Wisconsinan age, both of which resulted from drainage of Wisconsinan Glaciation through the Kaskaskia Valley flood plain. The Equality Formation is underlain by the Henry Formation, which consists of coarse textured material. Soils, such as Okaw soils that formed in these fine textured lacustrine deposits commonly are poorly drained and slowly to very slowly permeable.

About 20 percent of the soils formed mainly in Cahokia Alluvium. This material consists of recent alluvial sediment along such valleys as the Mississippi and Kaskaskia valleys and the valleys of smaller streams, such as Richland and Silver Creek. Soils, such as Wakeland soils, that formed in silty alluvial sediment commonly are in the Kaskaskia River valley and its tributaries. Soils, such as Darwin soils, that formed in fine textured clayey sediment are on the Mississippi River bottoms. They are intermingled with clayey and sandy soils, such as Landes fine sandy loam and Riley silty clay loam.

Climate

Climate affects soil formation through its effect on weathering, vegetation, and erosion. Freezing and



LEGEND

- CAHOKIA ALLUVIUM – RELATIVELY RECENT STREAM DEPOSITION
- PEORIA LOESS – UNDERLAIN BY GLACIAL TILL
- PEORIA LOESS – UNDERLAIN BY GLACIAL TILL (THIN) UNDERLAIN BY ST. LOUIS LIMESTONE (KARST)
- PEORIA LOESS – GREATER THAN 60 INCHES, UNDERLAIN BY ILLINOIAN OUTWASH – PEARL FORM.
- PEORIA LOESS – 0-60 INCHES THICK UNDERLAIN BY EQUALITY FORM. (CLAYEY) & HENRY FORM. (SANDY)

Figure 15.—**Parent materials of soils in St. Clair County.**

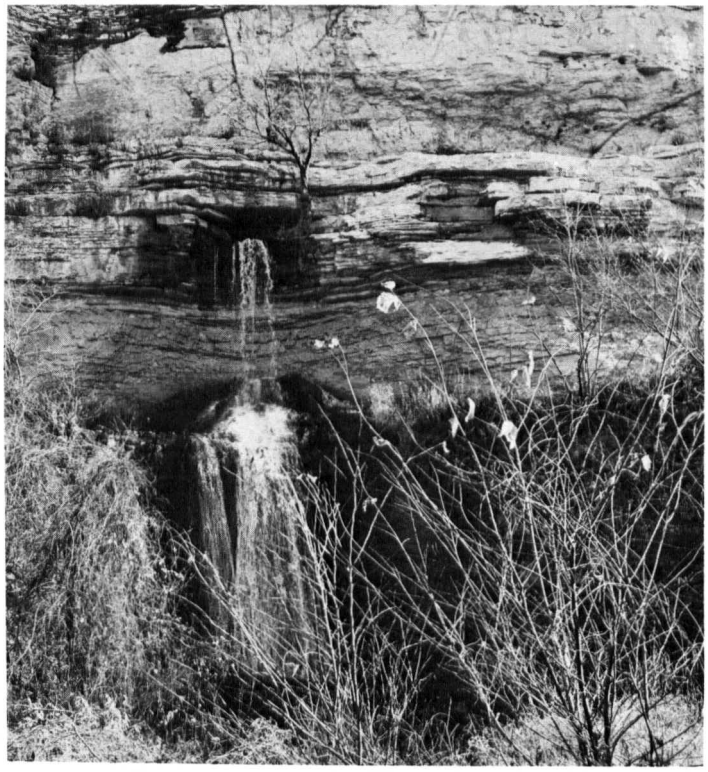


Figure 16.—Outlet of a series of sinkholes northeast of Dupo.

thawing help to break down minerals and rock fragments. Water received as rainfall percolates downward in soils that have favorable slope and permeability and carries with it bases and clay that then accumulate in the lower horizons.

The survey area has a climate that has been favorable to soil development. Enough water has percolated through the soil to cause fine particles, colloids, and soluble minerals to move downward. Consequently, most of the upland soils have a greater proportion of clay in the subsoil than in the surface layer.

On the basis of the average soil temperature, soils are classified in the mesic soil family.

Plants and animals

Plants have had the main effect on the formation of the soils in the survey area, but animals and organisms that live on and in the soils have also been important. The changes they caused depend mainly on the kinds of life processes peculiar to each species. The kinds of plants and animals that live on and in the soils are affected in turn by climate, parent material, relief, and the age of the soil.

Most of the upland soils in St. Clair County formed under forest, mainly oak and hickory trees. The soils that formed under prairie grasses have a darker colored surface layer than those that formed under forest, and they are higher in organic-matter content. Prairie vegetation existed on the upland ridge divide and the more nearly level areas in and around Mascoutah, Fayetteville, and Freeburg. The soils on the bottom lands were generally wooded at time of settlement. Some bottom land soils are dark colored and probably formed under a mixed grass and forest vegetation.

Small burrowing animals, insects, grubs, earthworms, crawfish, fungi, microbes, and other such organisms influence the formation of soil by mixing organic matter into the soil and by helping to break down the remains of plants. For example, it is generally quite evident that earthworms have mixed some of the soils to varying degrees and depths. Bacteria and fungi aid in the decomposition of plant and animal remains and thus add organic matter to the soil.

Relief

Relief controls the amount of moisture in the soil through its influence on the amount of runoff, the degree of erosion, and the amount of water infiltrating the soil.

In uniform material, such as loess, the differences in natural soil drainage generally are closely associated with slope or relief. Soil drainage in turn greatly affects the color of the soil. Soils that developed under good drainage, such as Alford and Tama soils, have a uniformly brown subsoil; however, soils that developed under poor drainage, such as Rushville and Okaw soils, have a grayish subsoil. Soils that developed under drainage conditions between good and poor have a sub-

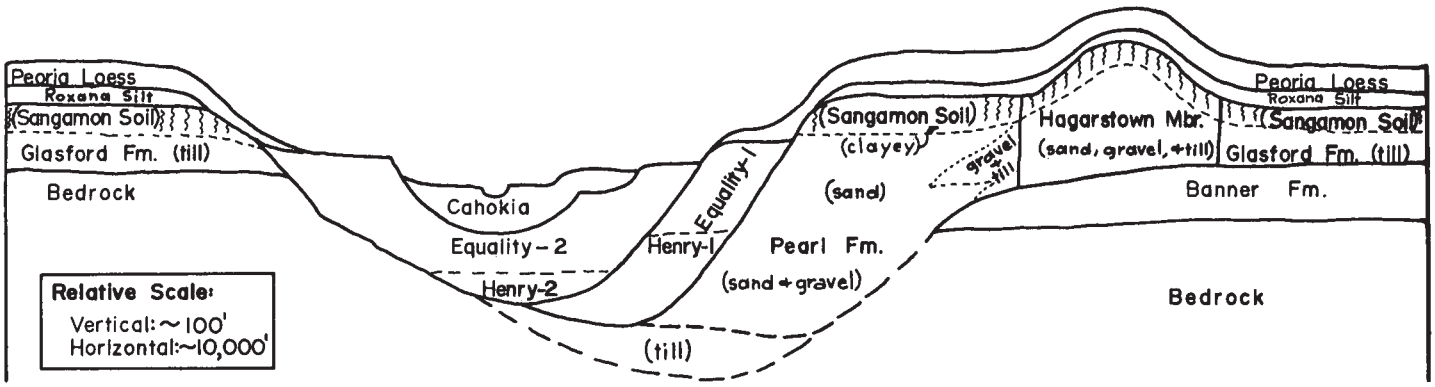


Figure 17.—Cross section of the Kaskaskia Valley in St. Clair County, showing underlying material. Source: Illinois State Geological Survey.

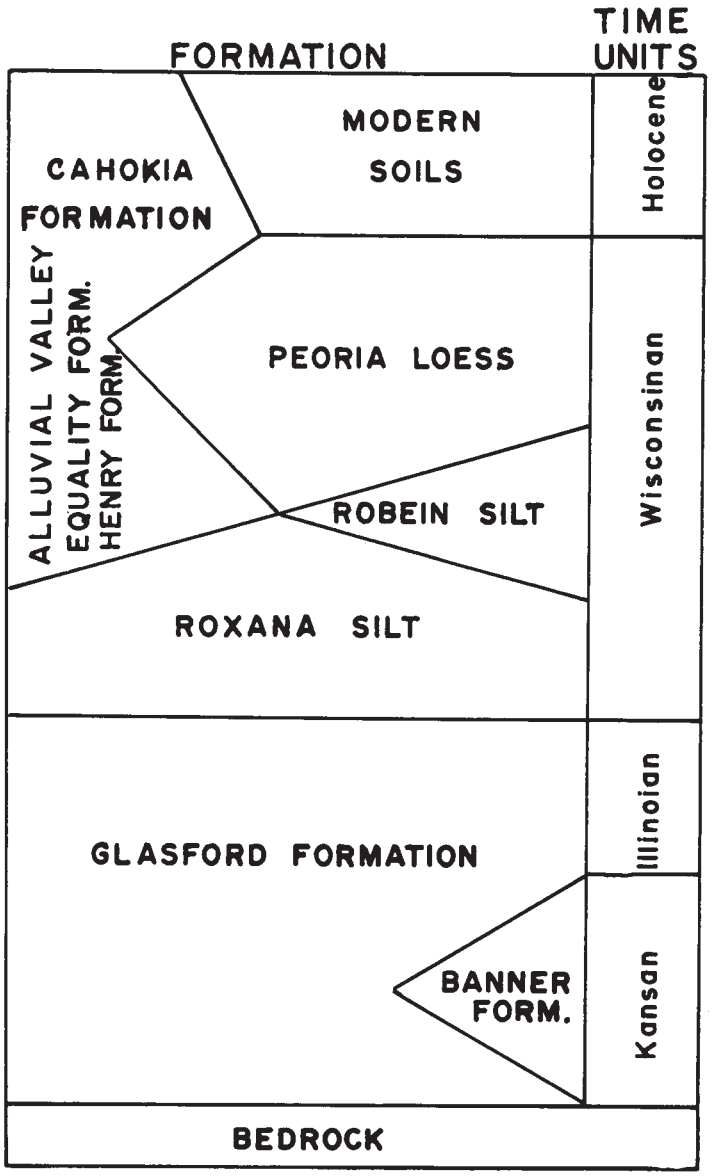


Figure 18.—Generalized Pleistocene stratigraphy in St. Clair County. Source: Illinois State Geological Survey (*12*).

soil that has gray and brown mottles. Iva and Herrick soils are examples. The grayish colors persist, even though the drainage is greatly improved by ditches and tile drains.

On steep soils where runoff is rapid, geologic erosion is likely almost to keep pace with soil development. Steep soils, such as Sylvan soils, are thin, and their horizons are weakly developed.

Relief, or the lack of it, is also related to the eluviation of clay from the A horizon to the B horizon. In the sloping Alford soils and in other steeper, well drained soils, the rate at which clay moves downward in the soil is only moderate. On the other hand, in nearly level soils, such as those of the Weir series, more clay has accumulated and the profile is generally more distinct than in Alford soils.

Time

Time is necessary for the formation of soil in parent material. A long period of time is generally required for the formation of soils that have distinct, well expressed horizons, but the length of time is largely dependent upon the combined action of the other soil-forming factors.

Soils normally become more strongly developed with increased time of exposure to weathering processes. On slopes where geologic erosion is rapid, however, such soils as the steep Sylvan soils may be in the early stages of development even though the slopes have been exposed to weathering for thousands of years.

Bottom land soils, such as Wakeland soils, accumulate surface deposits each time they become flooded. They are relatively young and only weakly developed. Okaw soils also formed in alluvium, but because they no longer become flooded, they have, in time, developed a more distinct profile.

Although such soils as the Alford and Tama soils formed in loess, which is geologically recent, they have developed well defined horizons over thousands of years.

Literature Cited

(1) Alexander, J. D. 1970. Average organic-matter content in Illinois soil types. Univ. Ill., Coll. Agric. Agron. Facts SP-36m 18 pp.
(2) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.
(3) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487–69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.
(4) Broadfoot, Walter M. 1964. Soil suitability for hardwoods in the midsouth. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Note SO–10, 10 pp., illus.
(5) Gilmore, A. R. 1963. Predicting yields of loblolly pine plantations in southern Illinois from soil characteristics. Univ. Ill. Dep. Forestry, Forestry Note 101, 11 pp., illus.
(6) Gilmore, A. R. 1963. Predicting yields of shortleaf pine plantations in southern Illinois from soil site characteristics. Univ. Ill. Dep. of Forestry, Forestry Note 106, 7 pp.
(7) Jacobs, A. M. 1971. Geology for planning St. Clair County, Illinois. Ill. State Geol. Surv. Circ. 465, 35 pp., illus.
(8) Odell, R. T., and W. R. Aschwald. 1970. Productivity of Illinois soils. Ill. Coop. Ext. Serv. Circ. 1016, 17 pp.
(9) Schnur, G. Luther. 1937. Yield, stand, and volume tables for even-aged upland oak forest. U.S. Dep. Agric. Tech. Bull. 560, 88 pp., illus. [Reprinted 1961]
(10) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173–188 issued May 1962]
(11) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.
(12) Willman, H. B., and J. C. Frye. 1970. Pleistocene stratigraphy of Illinois. Ill. State Geol. Surv. Bull. 94, 204 pp., illus.

Glossary

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

Alkali (sodic) soil. A soil having so high a degree of alkalinity

(pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Buried soil. A developed soil, once exposed but now overlain by more recently formed soil.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

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

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

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.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

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 a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Intake rate. The rate of entry of water into the soil, usually expressed in inches per hour. The rates apply to the upper 18 inches of soil where it is unsaturated and the surface covered by vegetation.

Rapid	Greater than 1.5 inches per hour
Moderate	1.0 to 1.5 inches per hour
Slow	Less than 1.0 inch per hour

Karst (topography). The relief of an area underlain by lime-

stone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

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

Very low	Less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2 to 4 percent
High	More than 4 percent

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Profile, soil. A vertical section of the soil extending through all its horizons and 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 described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

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

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickspot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, 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, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer

is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a management group, read the introduction to the section it is in for general information about its management.

Map symbol	Mapping unit	Described on page	Management group		Woodland group
			Symbol	Page	Symbol
8F2	Hickory loam, 18 to 30 percent slopes, eroded	28	VIe-1	54	1r
36B	Tama silt loam, 2 to 4 percent slopes	44	IIe-1	49	1o
36C2	Tama silt loam, 4 to 7 percent slopes, eroded	44	IIIe-1	50	1o
37B	Worthen silt loam, 1 to 4 percent slopes	47	IIe-1	49	1o
41A	Muscatine silt loam, 0 to 3 percent slopes	34	I-1	49	1o
U41B	Muscatine-Urban land complex, 1 to 4 percent slopes	34	------	----	------
46	Herrick silt loam	28	IIw-2	49	2o
48	Ebbert silt loam	23	IIw-2	49	2w
50	Virden silt loam	45	IIw-2	49	2w
61A	Atterberry silt loam, 0 to 3 percent slopes	15	I-1	49	2o
68	Sable silty clay loam	41	IIw-2	49	2w
70	Beaucoup silty clay loam	16	IIw-2	49	2w
71	Darwin silty clay	19	IIIw-5	53	3w
U71	Darwin-Urban land complex	19	------	----	------
V71	Darwin Variant silty clay	21	IIIw-5	53	3w
76	Otter silt loam	37	IIw-3	50	2w
81A	Littleton silt loam, 0 to 2 percent slopes	33	I-1	49	2o
84	Okaw silt loam	35	IIIw-3	53	4w
108	Bonnie silt loam	17	IIIw-4	53	2w
138	Shiloh silty clay loam	41	IIw-2	49	2w
150B	Onarga fine sandy loam, 1 to 4 percent slopes	36	IIe-3	49	1o
162	Gorham silty clay loam	26	IIw-3	50	2o
165	Weir silt loam	46	IIIw-3	52	4w
180	Dupo silt loam	22	IIw-3	50	2w
280B	Fayette silt loam, 2 to 4 percent slopes	24	IIe-1	49	1o
280B2	Fayette silt loam, 3 to 6 percent slopes, eroded	24	IIe-2	49	1o
280B3	Fayette silty clay loam, 3 to 6 percent slopes, severely eroded	25	IIIe-2	50	1o
280C2	Fayette silt loam, 6 to 12 percent slopes, eroded	24	IIIe-1	50	1o
280C3	Fayette silty clay loam, 6 to 12 percent slopes, severely eroded	25	IVe-1	53	1o
280D2	Fayette silt loam, 12 to 18 percent slopes, eroded	24	IVe-2	53	1r
280D3	Fayette silty clay loam, 12 to 18 percent slopes, severely eroded	25	VIe-1	54	1r
280E	Fayette silt loam, 18 to 30 percent slopes	24	VIe-1	54	1r
280E3	Fayette silty clay loam, 18 to 30 percent slopes, severely eroded	25	VIe-1	54	1r
280G	Fayette silt loam, 30 to 60 percent slopes	24	VIIe-1	54	1r
U280B	Fayette-Urban land complex, 1 to 7 percent slopes	25	------	----	------
U280C	Fayette-Urban land complex, 7 to 15 percent slopes	26	------	----	------
U280E	Fayette-Urban land complex, 15 to 25 percent slopes	26	------	----	------
304B	Landes fine sandy loam, 1 to 6 percent slopes	32	IIIs-1	51	1o
308B	Alford silt loam, 1 to 4 percent slopes	11	IIe-1	49	1o
308B2	Alford silt loam, 1 to 4 percent slopes, eroded	11	IIe-2	49	1o
308C2	Alford silt loam, 4 to 10 percent slopes, eroded	11	IIIe-1	50	1o
308C3	Alford silty clay loam, 4 to 10 percent slopes, severely eroded	13	IIIe-2	50	1o
308D2	Alford silt loam, 10 to 18 percent slopes, eroded	13	IVe-2	53	1r
308F3	Alford silty clay loam, 18 to 40 percent slopes, severely eroded	13	VIe-1	54	1r
H308C	Alford soils, Karst, 4 to 7 percent slopes	14	IIIe-1	50	1o
H308D	Alford soils, Karst, 7 to 15 percent slopes	14	IVe-1	53	1o
H308F	Alford complex, 15 to 30 percent slopes	14	VIe-1	54	1r
331	Haymond silt loam	27	I-2	49	1o
333	Wakeland silt loam	46	IIw-3	50	2o
338A	Hurst silt loam, 0 to 2 percent slopes	29	IIIw-3	52	3o
338B2	Hurst silt loam, 2 to 5 percent slopes, eroded	29	IIIe-3	51	3o
338C2	Hurst silty clay loam, 5 to 10 percent slopes, eroded	30	IVe-2	53	3o
S338B	Hurst silt loam, 1 to 4 percent slopes, sandy substratum	29	IIIe-3	51	3o
386B	Downs silt loam, 2 to 4 percent slopes	21	IIe-1	49	1o

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Management group		Woodland group
			Symbol	Page	Symbol
386C2	Down silt loam, 4 to 9 percent slopes, eroded	22	IIIe-1	50	1o
407	Udifluvents, loamy	44	IVw-1	54	1o
426	Karnak silty clay	31	IIIw-5	53	3w
452	Riley silty clay loam	40	IIw-3	50	2o
U452	Riley-Urban land complex	40	------	----	------
454A	Iva silt loam, 0 to 2 percent slopes	31	IIw-2	49	2o
454B	Iva silt loam, 2 to 4 percent slopes	31	IIe-1	49	2o
454B2	Iva silt loam, 2 to 4 percent slopes, eroded	31	IIe-2	49	2o
474	Piasa silt loam	39	IIIw-2	52	3t
533	Urban land	44	------	----	------
570B	Martinsville loam, 1 to 7 percent slopes	33	IIe-3	49	1o
619	Parkville silty clay	38	IIw-3	50	3w
620A	Darmstadt silt loam, 0 to 2 percent slopes	18	IIIs-2	51	3t
620B2	Darmstadt silt loam, 2 to 4 percent slopes, eroded	18	IIIs-3	51	3t
620C3	Darmstadt silty clay loam, 4 to 10 percent slopes, severely eroded	19	IVe-3	53	3t
801C	Orthents, silty, 3 to 10 percent slopes	36	IIIe-4	51	------
801G	Orthents, silty, 30 to 60 percent slopes	36	VIIe-2	54	------
802	Orthents, loamy	36	VIs-1	54	------
922C3	Alford-Hurst silty clay loams, 4 to 7 percent slopes, severely eroded	14	IVe-1	53	3o
922D3	Alford-Hurst silty clay loams, 7 to 15 percent slopes, severely eroded	15	VIe-2	54	3o
962E3	Sylvan-Bold silt loams, 15 to 30 percent slopes, severely eroded	42	VIe-1	54	2r
962G	Sylvan-Bold silt loams, 30 to 60 percent slopes	42	VIIe-1	54	2r
U962F	Sylvan-Bold-Urban land complex, 25 to 60 percent slopes	42	------	----	------
995	Piasa-Herrick silt loams	39	IIIw-2	52	3t
999E3	Alford-Hickory complex, 12 to 18 percent slopes, severely eroded	14	VIe-1	54	1r
999F3	Alford-Hickory complex, 18 to 30 percent slopes, severely eroded	14	VIe-1	54	1r

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978—219-962/36

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.