SOIL SURVEY

Pulaski County Indiana

OUR SOIL ★ OUR STRENGTH

Issued January 1968

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
Purdue University
Agricultural Experiment Station

Major fieldwork for this soil survey was done in the period 1961–64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service, the Purdue University Agricultural Experiment Station, and the Pulaski County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Pulaski County, Ind. contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Pulaski County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. 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 in the survey. This guide lists all of the soils of the county in alphabetical order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. 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 in the soil descriptions and in the discussions of the capability units.

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

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Wildlife."

Engineers and builders will find, under "Engineering," tables that give engineering descriptions of the soils and name soil features that affect engineering practices and structures.

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

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in Pulaski 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 section "General Nature of the County," which gives additional information about the county.

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NOTICE TO LIBRARIANS
Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued January 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF PULASKI COUNTY, INDIANA

BY SIDNEY PILGRIM, SOIL CONSERVATION SERVICE

FIELDWORK BY R. BELL, P. EDMONDS, K. HUFFMAN, AND G. PRESTON, SOIL CONSERVATION SERVICE, AND BY A. ZACHARY AND D. POST, PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION

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

PULASKI COUNTY is in the northwestern part of Indiana (fig. 1). It has a total area of 277,120 acres. Winamac, the county seat, is in the east-central part of the county.

Much of the topography is characterized by low-lying, nearly level areas and by many narrow, discontinuous sand ridges. The eastern part of the county is an area of nearly level to strongly sloping uplands. Two streams drain most of the county. The Tippecanoe River drains the eastern part, and the Big Monon Creek drains the western part.

The soils in Pulaski County formed in glacial outwash and till. The soils that formed in outwash material are sandy and very poorly drained to excessively drained. Those that formed in till are medium textured to fine textured and are very poorly drained to well drained. Generally, the poorly drained or wet soils are dark colored on the surface, and the better drained soils are light colored.

The county is mainly agricultural. It had 252,659 acres of land in farms in 1959. Corn and soybeans are the main crops, and livestock is raised for meat and dairy products. The climate is favorable for farming.

Farmers and landowners in the county organized the Pulaski County Soil and Water Conservation District in 1952. The District helps farmers who obtain technical assistance in soil and water conservation from the United States Department of Agriculture.

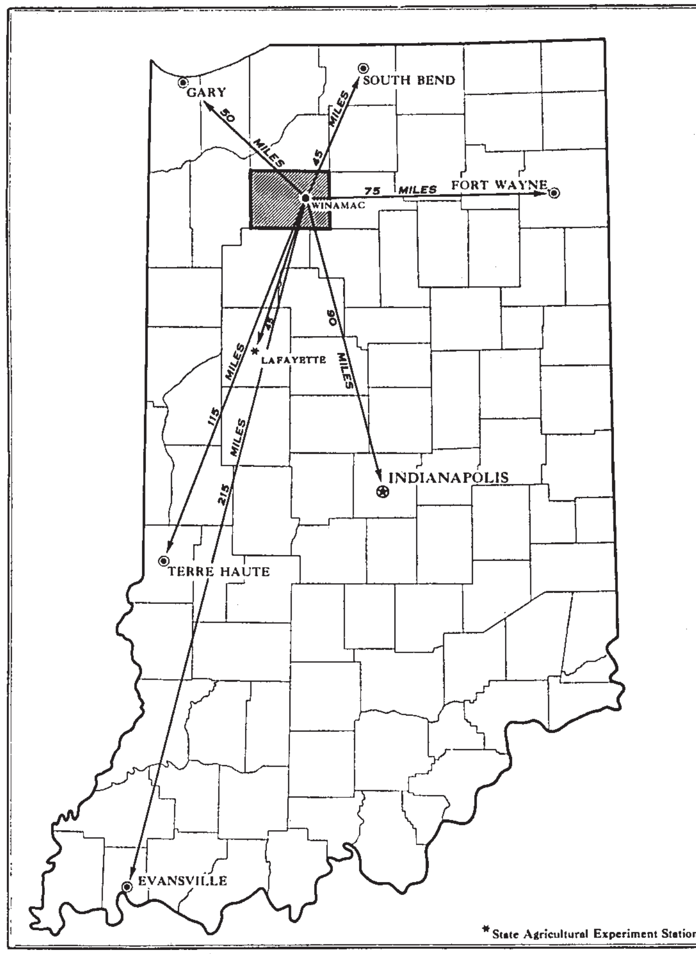

Figure 1.—**Location of Pulaski County in Indiana.**

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Pulaski County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug or bored 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 to the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles 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. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series 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. Brookston and Crosby, 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 natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects the use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Brookston silty clay loam and Brookston silt loam are two soil types in the Brookston series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. In Pulaski County, soil types are divided into phases primarily on the basis of difference in the underlying material. For example, Brookston mucky silt loam is a phase of Brookston silt loam. The presence of the muck in this phase affects the management of the soil.

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

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. 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 type or soil phase.

Some mapping units consist of two or more soils that occur together without regularity in pattern or relative proportion. These units are called undifferentiated groups. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. Miami soils, 6 to 12 percent slopes, severely eroded, is an undifferentiated group.

Some areas have been so altered by man that they cannot be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Clay pits, and are called land types rather than soils.

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then, they adjust these 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 present methods of use and management.

General Soil Map

The general soil map at the back of this report shows, in color, the soil associations in Pulaski County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The eight soil associations in Pulaski County are described in this section of the report.

1. Brookston-Crosby-Aubbeenaubbee association

Deep, dark colored and moderately dark colored, very poorly drained and somewhat poorly drained, nearly level and gently sloping soils that formed in loamy till

This association occupies about 10 percent of the county and occurs mostly in the southeastern part. It consists of soils that formed in medium-textured glacial till under forest or marsh vegetation.

Brookston and Crosby soils make up about 90 percent of the association. Brookston soils are very poorly drained and occur in nearly level areas and in depressions. They have a dark-colored, medium-textured and moderately fine textured surface layer and a gray, moderately fine textured subsoil. Crosby soils are somewhat poorly drained and are nearly level and gently sloping. They have a dark-colored, medium-textured and moderately coarse textured surface layer and a gray, mottled, moderately fine textured subsoil. Aubbeenaubbee soils also are somewhat poorly drained and are nearly level and gently sloping. Their surface layer is moderately dark colored and moderately coarse textured. Their subsoil is gray and mottled; in texture it grades from moderately coarse in the upper part to moderately fine in the lower part.

Among the less extensive soils are the well-drained Metea and the somewhat poorly drained Conover soils.

The soils of this association are used mainly as cropland. Excess water is the major limitation.

2. *Miami-Metea-Celina association*

Deep, light-colored and moderately dark colored, well drained and moderately well drained, nearly level to moderately sloping soils that formed in loamy till

This association occupies about 9 percent of the county and is in the eastern part. It consists of soils that formed in medium-textured glacial till under forest vegetation.

Miami and Metea soils make up about two-thirds of the association. Miami soils are well drained and are nearly level to moderately sloping. They have a light-colored to moderately dark colored, medium-textured and moderately coarse textured surface layer underlain by a yellowish-brown, moderately fine textured subsoil. Metea soils are well drained and are nearly level and gently sloping. They have a light-colored to very dark colored, coarse textured and moderately coarse textured surface layer. Their subsoil is yellowish brown and grades from a coarse texture in the upper part to a moderately fine texture in the lower part. Celina soils are moderately well drained and are nearly level and gently sloping. They have a light-colored to moderately dark colored, medium-textured and moderately coarse textured surface layer and a yellowish-brown, moderately fine textured subsoil.

Crosby soils occur to a minor extent in nearly level areas throughout the association.

The soils of this association are used mainly as cropland. They are strongly acid to slightly acid. The hazard of erosion is the main limitation, and droughtiness is a limitation of the Metea soils.

3. *Plainfield-Chelsea-Berrien association*

Deep, moderately dark colored, well drained and moderately well drained, nearly level to steep sandy soils on ridges

This association occupies about 22 percent of the county and occurs as small areas, mainly in the northern and central parts. It consists of soils that formed under forest vegetation in coarse-textured outwash material that has been reworked by wind.

Plainfield and Chelsea soils make up three-fourths of the association. Plainfield soils are well drained and are nearly level to steep. They have a surface layer that grades from very dark grayish brown to yellowish brown. It is underlain by a yellowish-brown layer that extends to a depth of 5 feet or more. Chelsea soils are well drained and are nearly level to strongly sloping. They have a very dark to light brownish-gray surface layer underlain by a brown layer that extends to a depth of 3 to 5 feet or more. Thin, discontinuous, alternating layers of brown loamy fine sand and yellowish-brown fine sand occur in these soils at a depth of 4 to 4½ feet. Berrien soils are moderately well drained and are nearly level and gently sloping. They have a dark-brown to light brownish-gray surface layer underlain by a yellowish-brown layer mottled with gray. All of these soils are coarse textured throughout.

Among the less extensive soils in the association are Morocco and Newton soils and a small acreage of alluvial soils along the northern part of the Tippecanoe River. Morocco soils are somewhat poorly drained and occur in nearly level areas adjoining the sand ridges. Newton soils are very poorly drained and occur in small depressions between the ridges.

These soils are used mostly for permanent pasture or as woodland, and they are commonly used for growing Christmas trees. Some of the nearly level areas are used as cropland. Droughtiness and the hazard of wind erosion are the main limitations.

4. *Maumee-Newton-Gilford-Rensselaer association*

Deep, dark-colored, very poorly drained, nearly level soils in depressions on outwash plains

This association, the largest in the county, occupies 38 percent of the county and occurs mainly in the northern and central parts. It consists of soils that formed in coarse-textured to medium-textured outwash material.

Maumee and Newton soils make up about three-fourths of the association. All of the soils in this association have a black to very dark gray surface layer. Maumee soils have a coarse or moderately coarse textured surface layer and a grayish-brown, coarse-textured subsoil. Newton soils have a coarse-textured surface layer and a brownish-gray, coarse-textured subsoil. Gilford soils have a dark-colored moderately coarse textured or medium-textured surface layer and a gray, moderately coarse textured to moderately fine textured subsoil. Rensselaer soils have a dark-colored, medium-textured surface layer and a gray, moderately fine textured subsoil.

Somewhat poorly drained Brady and Morocco soils occur to a minor extent in slightly elevated, nearly level areas. Very poorly drained Westland soils occur with Gilford soils in the southern part of the association.

All the soils of this association are used as cropland. Maumee, Gilford, and Rensselaer soils are medium acid to neutral, and Newton soils are very strongly acid or strongly acid. A high water table and wind erosion are the major limitations. Installation of a drainage system is essential.

5. *Carlisle-Tawas-Edwards association*

Dark-colored, very poorly drained, nearly level soils that formed in deep organic deposits or on shallow organic deposits underlain by coarse-textured material or marl

This association occupies about 6 percent of the county and occurs mainly in the north-central part. It consists of soils that formed in decomposed, woody and sedgy plant material.

Carlisle and Tawas soils make up about 90 percent of the association. All of the soils in this association are in depressions and have a black muck surface layer. In the Carlisle soils, the muck is about 1 foot thick, and below this depth it grades to brown peat. The total thickness of the organic material is 3½ feet or more. Tawas soils have a muck layer 1½ to 2½ feet thick, abruptly underlain by coarse-textured mineral soil. Edwards soils have a layer of muck 1½ to 2 feet thick, abruptly underlain by gray marl.

Adjoining the muck deposits are small areas of the very poorly drained Wallkill soils and Maumee soils. The Wallkill soils consist of 10 to 40 inches of mineral material that has been deposited over the muck.

The soils of this association are used mainly as cropland. A high water table is the main limitation, and the installation of a drainage system is essential. Wind erosion is a hazard during spring.

6. *Brookston-Odell-Corwin association*

Deep, dark-colored, very poorly drained, somewhat poorly drained, and moderately well drained, nearly level soils that formed in loamy till

This association occupies about 7 percent of the county area and is in the southwestern part. It consists of soils that formed in medium-textured glacial till under prairie grass.

Brookston soils make up nearly 60 percent of the association, and Odell soils nearly 25 percent. Brookston soils are in depressions and are very poorly drained. They have a dark-colored, medium-textured and moderately fine textured surface layer and a grayish-brown, moderately fine textured subsoil. Odell soils are somewhat poorly drained. They have a dark-colored, medium-textured surface layer. Their moderately fine textured subsoil is grayish brown with many yellowish-brown mottles. Corwin soils are gently sloping in some areas and are moderately well drained. They have a dark-colored, medium-textured surface layer. Their subsoil is moderately fine textured and is yellowish brown with pale-brown mottles in the lower part.

The well-drained Parr and Ayr soils are of minor extent and occur in nearly level and gently sloping areas.

The soils of this association are used mainly as cropland. They are medium acid to neutral. Excess water is the major limitation of Brookston and Odell soils, and a combination of tile and surface drainage is necessary. The Corwin soils are not limited by excess water and ordinarily do not need tile drainage.

7. *Rensselaer-Montgomery association*

Deep, dark-colored, very poorly drained, nearly level soils on lake plains

This association occupies about 4 percent of the county area and occurs in the western and southwestern parts. It is made up of soils that formed in medium-textured to fine-textured lacustrine deposits. These soils are in depressions.

Rensselaer soils make up nearly 80 percent of the association. They have a black, medium-textured surface layer and a grayish-brown, moderately fine textured subsoil underlain by silt and very fine sand. Montgomery soils are fine textured throughout. They have a very dark brown surface layer and grayish-brown subsoil. Of minor extent are the very poorly drained Mermill soils, the somewhat poorly drained Darroch and Strole soils, and the moderately well drained Foresman soils.

These soils are used mainly as cropland. They are slightly acid to neutral. Excess water is the major limitation, and a combination of tile and surface drainage is necessary.

8. *Oshtemo-Bronson association*

Deep, moderately dark colored, well drained and moderately well drained, nearly level to moderately sloping soils on outwash terraces

This association occupies about 4 percent of the county and occurs along the Tippecanoe River and its tributaries. It consists of soils that formed in sandy loam and loamy sand outwash material underlain by sand and gravel or by stratified fine sand and silt.

These soils have a coarse textured and moderately coarse textured surface layer and subsoil. Oshtemo soils, which make up about 70 percent of the association, are nearly level to moderately sloping and are well drained. They have a dark-brown to light brownish-gray surface layer and a yellowish-brown subsoil. Bronson soils are nearly level and gently sloping and are moderately well drained. They also have a dark-brown to light brownish-gray surface layer and a yellowish-brown subsoil, but the subsoil is mottled with pale brown in the lower part. Less extensive soils in the association are the well-drained Fox soils, which are in nearly level and gently sloping areas along the Tippecanoe River, and the somewhat poorly drained Brady soils, which are in nearly level areas throughout the association.

The soils of this association are used mainly as cropland. Droughtiness and erosion are the major limitations.

Descriptions of the Soils

In this section the soils of Pulaski County are described and their use and suitability are discussed. First, each soil series is described, then the soils in that series. Thus, to get full information about any one mapping unit, it is necessary to read the description of that unit and also the description of the series.

Descriptions of color and consistence are for moist soils. Terms used in describing the soils are defined in the Glossary. A more detailed technical description of each soil series is given in the section "Formation, Classification, and Morphology of Soils."

Figure 2 shows the topographical relationship between a few of the major soils in the county. Table 1 gives the acreage and proportionate extent of the soils.

The location and distribution of the soils are shown on the detailed soil map at the back of this report. "How To Use This Soil Survey," on the inside of the front cover, explains how to locate the soils on the map. At the end of each soil description, the capability unit and woodland suitability group in which the soil has been placed are given in italics. These groups are described in the section "Use and Management of Soils." The Guide to Mapping Units at the back of this report is a page index to information about each mapping unit.

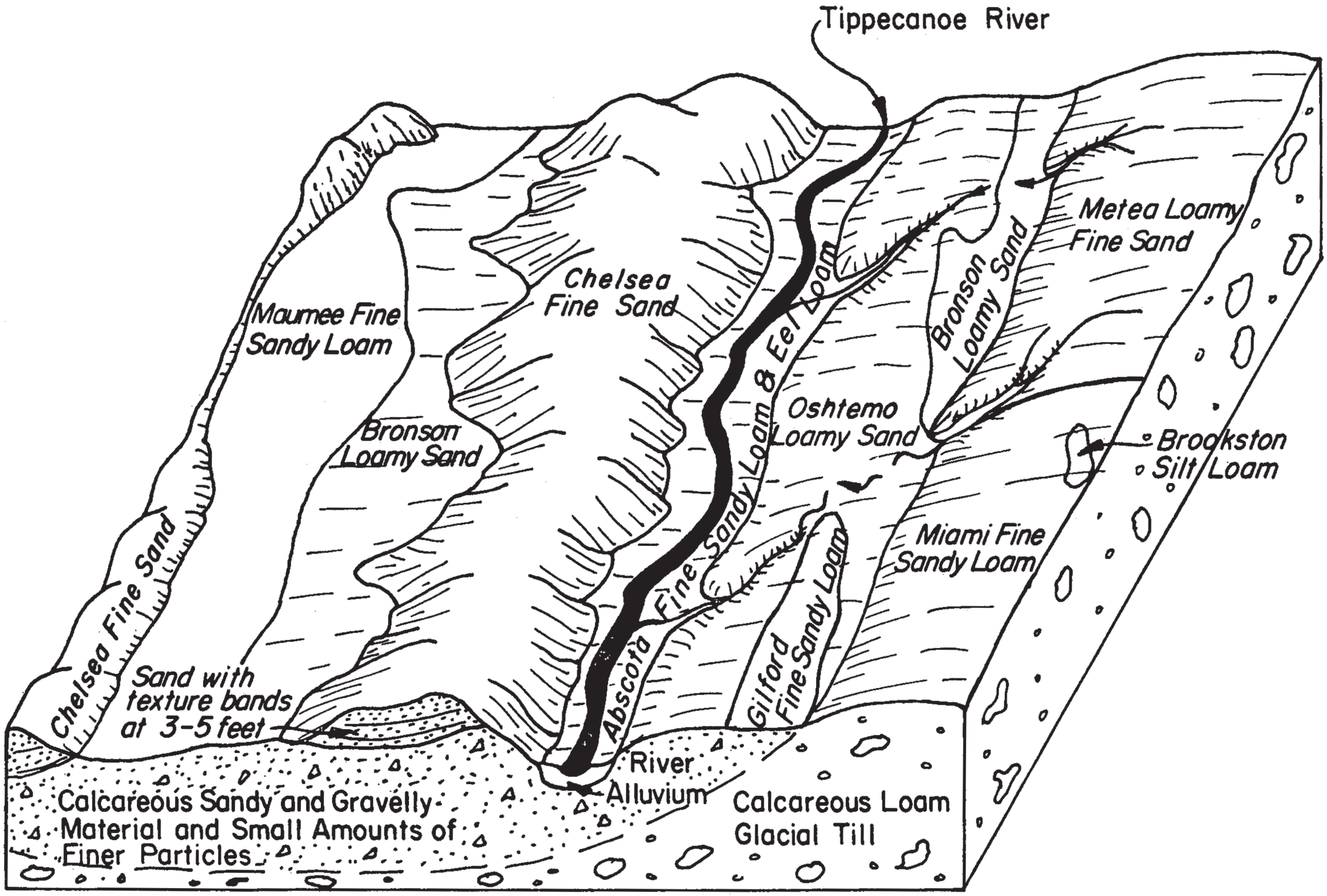

Figure 2.—**Topographical relationships between a few of the major soils in the county.**

Abscota Series

The Abscota series consists of deep, well-drained soils that formed in sandy material deposited by flowing water. These soils occur as nearly level areas on bottom lands along Mill Creek and the Tippecanoe River. Representative profile—

0 to 13 inches, very dark grayish-brown fine sandy loam; very friable.
13 to 30 inches +, dark-brown loamy fine sand; very friable.

The natural fertility is medium, the content of organic matter is medium, and the available moisture capacity is low. Permeability is rapid. The reaction is slightly acid to mildly alkaline.

Because these soils are subject to occasional overflow, only a limited number of crops grow well on them. Corn and soybeans are the principal crops grown.

Abscota fine sandy loam (0 to 2 percent slopes) (Ab).—This soil occurs mostly as narrow areas on bottom lands along the Tippecanoe River. It also occurs on some of the islands in the river. Small areas of loam and small areas of Eel soils were included in mapping.

This soil is flooded occasionally. The hazard is greatest from December through June. Consequently, growing a fall-seeded grain or a meadow crop is not practical. Most of the acreage is woodland. The small acreage that is used for crops can be cultivated intensively. *Capability unit I-2; woodland suitability group 8*

Ade Series

The Ade series consists of deep, excessively drained soils that formed in very strongly acid to medium acid sandy drift reworked by wind. The native vegetation was prairie grass. These soils occur as gently sloping areas in the southwestern part of the county. Representative profile—

0 to 10 inches, very dark brown to very dark grayish-brown loamy fine sand; very friable.
10 to 29 inches, dark-brown to brown light loamy fine sand; very friable.
29 to 52 inches, alternating layers of dark-brown heavy loamy fine sand that is very friable and brown fine sand that is loose.
52 to 70 inches +, pale-brown to yellowish-brown fine sand; loose.

The natural fertility is low, the content of organic matter is medium to high, and the available moisture capacity is low. Permeability is rapid. The reaction is very strongly acid or strongly acid.

Ade soils are droughty and for this reason are generally not suitable for row crops, but they can be used for small grain and hay.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Abscota fine sandy loam	822	0. 3
Ade loamy fine sand, 2 to 6 percent slopes	147	. 1
Aubbeenaubbee fine sandy loam, 0 to 2 percent slopes	1, 634	. 6
Ayr fine sandy loam, 0 to 2 percent slopes	275	. 1
Berrien loamy fine sand, 0 to 2 percent slopes	19, 279	7. 0
Berrien loamy fine sand, 2 to 6 percent slopes	8, 003	2. 9
Blount loam, 0 to 2 percent slopes	130	[1]
Brady fine sandy loam	1, 902	. 7
Brady loamy fine sand	1, 803	. 6
Bronson loamy sand, 0 to 2 percent slopes	2, 188	. 8
Bronson sandy loam, 0 to 2 percent slopes	834	. 3
Brookston loam	10, 877	3. 9
Brookston mucky silt loam	95	[1]
Brookston silt loam	17, 692	6. 4
Brookston silty clay loam	546	. 2
Carlisle muck	10, 254	3. 7
Celina fine sandy loam, 0 to 2 percent slopes	5, 539	2. 0
Celina fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 182	. 4
Celina loam, 0 to 2 percent slopes	3, 037	1. 0
Celina loam, 2 to 6 percent slopes, moderately eroded	118	[1]
Chelsea fine sand, 0 to 2 percent slopes	398	. 1
Chelsea fine sand, 2 to 6 percent slopes	2, 712	1. 0
Chelsea fine sand, 6 to 12 percent slopes	1, 352	. 5
Chelsea fine sand, 12 to 18 percent slopes	260	. 1
Conover loam, 0 to 2 percent slopes	1, 705	. 6
Conover silt loam, 0 to 2 percent slopes	896	. 3
Corwin loam, 0 to 2 percent slopes	2, 825	1. 0
Corwin silt loam, 0 to 2 percent slopes	545	. 2
Corwin silt loam, 2 to 6 percent slopes, moderately eroded	112	. 1
Crosby fine sandy loam, 0 to 2 percent slopes	3, 917	1. 4
Crosby loam, 0 to 2 percent slopes	3, 527	1. 3
Crosby silt loam, 0 to 2 percent slopes	159	. 1
Crosby silt loam, 2 to 6 percent slopes	233	. 1
Darroch loam	416	. 2
Darroch loam, clay substratum	138	[1]
Darroch silt loam	468	. 2
Edwards muck	1, 578	. 6
Eel loam	749	. 3
Foresman loam	509	. 2
Foresman fine sandy loam, sandy variant	800	. 3
Fox sandy loam, 0 to 2 percent slopes	223	. 1
Gilford fine sandy loam	10, 503	3. 8
Gilford loam	4, 279	1. 5
Gilford loam, ferruginous variant	128	[1]
Homer sandy loam	263	. 1
Hoopeston fine sandy loam	504	. 2
Maumee fine sandy loam	48, 026	17. 3
Maumee fine sandy loam, ferruginous variant	891	. 3
Maumee loamy fine sand	3, 368	1. 2
Maumee mucky fine sandy loam	1, 300	. 5
Mermill loam	100	[1]
Mermill silt loam	450	. 2
Metea loamy fine sand, 0 to 2 percent slopes	2, 477	. 9
Metea loamy fine sand, 2 to 6 percent slopes	5, 151	1. 9
Miami fine sandy loam, 0 to 2 percent slopes	2, 982	1. 1
Miami fine sandy loam, 2 to 6 percent slopes	996	. 4
Miami fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 325	. 5
Miami fine sandy loam, 6 to 12 percent slopes, moderately eroded	231	. 1
Miami loam, 0 to 2 percent slopes	356	. 1
Miami soils, 6 to 12 percent slopes, severely eroded	44	[1]
Montgomery silty clay	1, 556	. 6
Morocco loamy fine sand	9, 357	3. 4
Newton loamy fine sand	14, 603	5. 3
Odell loam	1, 181	. 4
Odell silt loam	3, 719	1. 3
Oshtemo fine sandy loam, loamy substratum, 0 to 2 percent slopes	2, 005	. 7
Oshtemo fine sandy loam, loamy substratum, 2 to 6 percent slopes	289	. 1
Oshtemo loamy sand, 0 to 2 percent slopes	2, 138	. 8
Oshtemo loamy sand, 2 to 6 percent slopes	1, 607	. 6
Oshtemo loamy sand, 6 to 12 percent slopes	659	. 2
Oshtemo loamy fine sand, loamy substratum, 0 to 2 percent slopes	805	. 3
Oshtemo loamy fine sand, loamy substratum, 2 to 6 percent slopes	412	. 1
Parr loam, 2 to 6 percent slopes, moderately eroded	273	. 1
Plainfield fine sand, 0 to 2 percent slopes	1, 159	. 4
Plainfield fine sand, 2 to 6 percent slopes	20, 362	7. 3
Plainfield fine sand, 6 to 12 percent slopes	6, 716	2. 4
Plainfield fine sand, 12 to 25 percent slopes	1, 289	. 5
Rensselaer loam	3, 126	1. 1
Rensselaer silt loam	1, 019	. 4
Seward loamy fine sand, 2 to 6 percent slopes	171	. 1
Sloan loam, calcareous variant	490	. 2
Sloan silt loam, calcareous variant	377	. 1
Strole silt loam	1, 779	. 6
Tawas muck	4, 957	1. 8
Wallkill silt loam	299	. 1
Washtenaw silt loam	315	. 1
Westland loam, moderately deep	1, 420	. 5
Westland silt loam, moderately deep	419	. 2
Clay pits	30	[1]
Intermittent lakes	150	. 1
Sand and gravel pits	150	. 1
Stone Quarries (limestone)	50	. 1
Water	1, 055	. 4
Total	277, 120	100. 0

[1] Less than 0.5 of 1 percent.

Ade loamy fine sand, 2 to 6 percent slopes (AdB).—This soil is on sand ridges. It adjoins Ayr soils and is farmed with them because it rarely makes up an entire field. A few small, nearly level areas of fine sand were included in mapping.

Droughtiness, the major limitation, very severely limits the growth of corn and other crops that require large amounts of water. Meadow crops and small grain are suitable. Areas that lack a protective cover are subject to severe wind erosion. *Capability unit IVs-1; woodland suitability group 23*

Aubbeenaubbee Series

The Aubbeenaubbee series consists of deep, somewhat poorly drained soils that formed in 18 to 36 inches of sandy material over loam till. The native vegetation was deciduous forest. These soils occur as nearly level and gently sloping areas, mostly in the eastern and southeastern parts of the county. Representative profile—

0 to 8 inches, dark grayish-brown fine sandy loam; friable.
8 to 30 inches, pale-brown loamy sand; many yellowish-brown and gray mottles; very friable.

30 to 46 inches, pale-brown and light brownish-gray sandy clay loam or clay loam; many strong-brown mottles; firm.
46 to 54 inches +, light olive-brown loam till; many yellowish-brown mottles; friable.

The content of organic matter is low, and the available moisture capacity is low to medium. Permeability is rapid in the sandy surface layer and moderately slow in the sandy clay loam or clay loam. The reaction is strongly acid to slightly acid.

Aubbeenaubbee soils have a high water table in spring, but most of the acreage is cultivated.

Aubbeenaubbee fine sandy loam, 0 to 2 percent slopes (AuA).—This soil occurs as small knobs within broad areas of Brookston soils and as nearly level areas adjoining Crosby soils and Metea soils. It rarely makes up an entire field, so it is farmed with the adjoining soils. Included in mapping were small, scattered areas of loamy fine sand and small areas of Crosby fine sandy loam.

A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage is necessary in some areas. If adequately drained, this soil is well suited to row crops and to grass-legume mixtures. *Capability unit IIIw-3; woodland suitability group 5*

Ayr Series

The Ayr series consists of deep, well-drained soils that formed in 20 to 36 inches of loamy sand to sandy loam material over loam to light clay loam till. The native vegetation was prairie grass. These soils occur as nearly level and gently sloping areas in the southwestern part of the county. Representative profile—

0 to 20 inches, very dark gray fine sandy loam; grades to very dark grayish brown in the lower part; very friable.
20 to 29 inches, yellowish-brown loamy fine sand; very friable.
29 to 40 inches, brown clay loam; firm.
40 to 45 inches +, yellowish-brown limy loam till with pale-brown mottles; friable.

The natural fertility is medium, the content of organic matter is high, and the available moisture capacity is low to medium. Permeability is rapid in the sandy surface layer and moderately slow in the loam till. The reaction ranges from very strongly acid in the surface layer to slightly acid in the subsoil.

Most of the acreage is cultivated, but corn and other crops that require large amounts of water may be damaged by drought.

Ayr fine sandy loam, 0 to 2 percent slopes (AyA).—This soil is on the till plain in the southwestern part of the county. It adjoins Ade soils and Parr soils and is farmed with them, as it rarely makes up an entire field. Included in mapping were small areas in which the slope is 3 or 4 percent and small areas of Corwin soils.

This soil has moderate limitations for crops commonly grown in the county. It tends to be droughty, even though runoff is slow and most of the rainfall is absorbed. Most of the acreage is cropland. *Capability unit IIs-3; woodland suitability group 23*

Berrien Series

The Berrien series consists of deep, moderately well drained soils that formed in very strongly acid and strongly acid sand. These soils are known locally as "yellow sands." The native vegetation was deciduous forest. Berrien soils occur as nearly level or gently sloping areas adjoining Plainfield soils throughout the central and eastern parts of the county. Representative profile—

0 to 9 inches, dark-brown loamy fine sand; very friable.
9 to 24 inches, yellowish-brown fine sand; loose.
24 to 60 inches +, yellow and very pale brown fine sand with many yellowish-brown and light-gray mottles; loose.

The natural fertility, the content of organic matter, and the available moisture capacity are low. Permeability is rapid. The reaction is very strongly acid to strongly acid.

These soils are droughty and generally are not well suited to tilled crops.

Berrien loamy fine sand, 0 to 2 percent slopes (BcA).—This soil occurs between Morocco soils, which are downslope, and Plainfield soils, which are upslope. Included in mapping were a few small areas of fine sand and small areas of Morocco soils.

Droughtiness is the major limitation, and wind erosion is a hazard in areas that lack protective vegetation. Some areas are likely to be excessively drained if the water table is lowered nearby. Surface runoff is slow, and most of the rainfall is absorbed. Corn and other crops that need large amounts of water are not suitable, but meadow crops and small grain can be grown. *Capability unit IVs-1; woodland suitability group 17*

Berrien loamy fine sand, 2 to 6 percent slopes (BcB).—This soil adjoins Plainfield and Chelsea soils, which are upslope. The slope generally is 3 or 4 percent. Small areas of Plainfield and Chelsea soils were included in mapping.

Droughtiness is the major limitation. Wind erosion is a severe hazard where there is no protective vegetation. Some areas are likely to be excessively drained if the water table is lowered nearby. Meadow crops and small grain can be grown. *Capability unit IVs-1; woodland suitability group 17*

Blount Series

The Blount series consists of deep, somewhat poorly drained soils that formed in glacial till of clay loam to silty clay loam texture. The native vegetation was deciduous forest. These soils occur as nearly level areas in the northwestern part of the county. Representative profile—

0 to 8 inches, dark grayish-brown loam; friable.
8 to 11 inches, brown light clay loam; yellowish-brown mottles; firm.
11 to 29 inches, yellowish-brown to dark-brown silty clay; common to many grayish-brown mottles; very firm.
29 to 35 inches, yellowish-brown, limy silty clay loam till; many gray, light brownish-gray, and dark yellowish-brown mottles; firm.
35 to 42 inches +, gray and light brownish-gray, limy silty clay loam till; many yellowish-brown mottles; firm.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is high. Permeability is slow in the subsoil. Reaction ranges from medium acid to neutral in the surface layer and from medium acid to slightly acid in the underlying layers down to the limy till.

260-263—67——2

Blount soils have a seasonal high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Blount loam, 0 to 2 percent slopes (BaA).—This soil adjoins Seward soils on the till plain. Most of it is along the county line west of Medaryville. Small areas of silt loam and small areas in which the slope is 3 percent were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage is required in some areas. Including a deep-rooted legume in the cropping system improves drainage. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 5*

Brady Series

The Brady series consists of deep soils that are nearly level and are somewhat poorly drained. These soils formed in sandy loam and loamy sand outwash underlain at a depth of 42 to 70 inches or more by limy sand and gravel or stratified fine sand and silt. The native vegetation was deciduous forest and grass. Representative profile—

0 to 8 inches, very dark grayish-brown loamy fine sand that grades to heavy loamy sand in the lower part; very friable in the upper part and friable in the lower part.
8 to 13 inches, dark grayish-brown to dark-brown loamy sand; discontinuous brown streaks; friable.
13 to 22 inches, light brownish-gray light sandy loam that grades to pale brown in the lower part; reddish-brown, light brownish-gray, dark-brown, and yellowish-brown mottles; friable.
22 to 46 inches, gray sandy loam that grades to light olive brown in the lower part; many pale-brown, dark yellowish-brown, and yellowish-brown mottles; friable.
46 to 60 inches +, light-gray sand and some fine gravel that grades to light brownish gray in the lower part; loose; limy at a depth of 55 inches.

The natural fertility is medium. The content of organic matter is medium, and the available moisture capacity is low. Permeability is moderately rapid in the subsoil and rapid in the underlying sand and fine gravel. The reaction of the surface layer and subsoil ranges from very strongly acid to neutral.

These soils have a seasonal high water table, but they are well suited to row crops and grass-legume mixtures if drained and fertilized.

Brady fine sandy loam (0 to 2 percent slopes) (Bd).—This soil occurs as small knobs within broad areas of Gilford soils and as nearly level areas adjoining Gilford soils that are in depressions. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of loam and small areas of Gilford soils were included in mapping.

This soil has only moderate limitations for crops commonly grown in the county. A high water table is the major limitation. Open ditches, supplemented in some areas by tile, are necessary if crops are grown. Most of the acreage is cropland. *Capability unit IIIw-4; woodland suitability group 20*

Brady loamy fine sand (0 to 2 percent slopes) (Bf).—This soil adjoins the Gilford soils, which are downslope, and the Bronson soils, which are upslope. It is farmed with those soils because it rarely makes up an entire field. Small areas of Bronson soils were included in mapping.

A high water table is the major limitation. Open ditches, supplemented by tile in some areas, are necessary if crops are grown. Runoff is slow, and most of the rainfall is absorbed by the soil. Most of the acreage is cropland. *Capability unit IIIw-4; woodland suitability group 20*

Bronson Series

The Bronson series consists of deep, nearly level, moderately well drained soils in the northeastern part of the county. These soils formed in sandy loam and loamy sand outwash underlain by limy sand and gravel at a depth of 42 to 70 inches or more. The native vegetation was deciduous forest. Representative profile—

0 to 10 inches, dark-brown loamy sand; very friable.
10 to 21 inches, yellowish-brown loamy sand that grades to brownish yellow in the lower part; very friable.
21 to 27 inches, reddish-yellow and strong-brown loamy sand; many pale-brown mottles; very friable.
27 to 49 inches, gray and light brownish-gray sandy loam; many strong-brown and yellowish-brown mottles; friable.
49 to 65 inches +, gray and light-gray sand; many dark-brown mottles in upper part; loose; limy at a depth of 59 inches.

The natural fertility is low. The content of organic matter is medium, and the available moisture capacity is low. Permeability is moderately rapid in the subsoil and rapid in the underlying sand and fine gravel. The reaction of the surface layer and subsoil ranges from very strongly acid to medium acid.

These soils are droughty. They are well suited to small grain and to grass-legume mixtures if they are managed so that drought does not damage the crops.

Bronson loamy sand, 0 to 2 percent slopes (BgA).—This soil occurs between the Brady soils, which are downslope, and the Oshtemo soils, which are upslope. It rarely makes up an entire field and generally is farmed with adjoining soils. Small areas of Oshtemo soils and small areas in which the slope is 3 percent were included in mapping.

This soil has severe limitations. It is droughty, although most of the rainfall is absorbed and runoff is slow. Some areas are excessively drained if the water table is lowered nearby. Meadow crops and small grain are suitable. A green-manure crop adds organic matter to the soil and holds moisture. *Capability unit IVs-1; woodland suitability group 17*

Bronson sandy loam, 0 to 2 percent slopes (BmA).—This soil occurs as small areas between the Brady soils, which are downslope, and the Oshtemo soils, which are upslope. Some areas of it are as much as 7 acres in size. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of loamy sand were included in mapping.

This soil has severe limitations. Droughtiness limits the growth of corn and other crops that require large amounts of water. Some areas are excessively drained if the water table is lowered nearby. Meadow crops and small grain are suitable. A green-manure crop adds organic matter to the soil and holds moisture. *Capability unit IIIs-1; woodland suitability group 17*

Brookston Series

The Brookston series consists of deep, very poorly drained soils, known locally as "black gumbo." These soils formed in light clay loam to loam till under marsh grass. They occur as nearly level areas and depressions throughout the eastern and southern parts of the county. Representative profile—

0 to 11 inches, black silt loam; friable.
11 to 40 inches, very dark gray and dark grayish-brown clay loam; many gray mottles; friable to firm.
40 to 45 inches +, brownish-yellow, limy loam till; many gray mottles; friable.

The natural fertility, the content of organic matter, and the available moisture capacity are high. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from slightly acid to neutral.

These soils were originally wet, but most areas have been drained. They are well suited to corn and other grain crops and produce good yields if fertilized.

Brookston loam (0 to 2 percent slopes) (Bn).—This soil has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of silt loam and small areas of Conover and Odell soils were included in mapping.

If drained, this soil can be cultivated intensively. A combination of tile and surface drainage is satisfactory. Most of the acreage is cropland. *Capability unit IIw–1; woodland suitability group 11*

Brookston mucky silt loam (0 to 2 percent slopes) (Bo).—This soil occurs as small pockets within areas of other Brookston soils. It also adjoins Carlisle muck. It has a profile similar to the one described for the series, except for the high content of organic matter in the surface layer.

If drained, this soil can be cultivated intensively. A combination of tile and surface drainage is satisfactory. Most of the acreage is cropland. *Capability unit IIw–1; woodland suitability group 11*

Brookston silt loam (0 to 2 percent slopes) (Br).—This soil is in narrow, fingerlike depressions and in relatively broad depressions, generally at lower elevations than the adjoining Conover, Odell, and Crosby soils. Small areas of loam and small areas of Conover soils were included in mapping. Small areas underlain by limestone at a depth of 18 to 42 inches were included in the mapping southwest of Francesville.

A high water table is the major limitation, and runoff is very slow or ponded. If drained, this soil can be cultivated intensively. A combination of tile and surface drains works satisfactorily. Most of the acreage is cropland. *Capability unit IIw–1; woodland suitability group 11*

Brookston silty clay loam (0 to 2 percent slopes) (Bs).—This soil has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of silt loam were included in mapping.

This soil is difficult to work because of the high clay content in the surface layer. It clods if worked when wet. The occasional use of a green-manure crop helps to maintain good tilth. *Capability unit IIw–1; woodland suitability group 11*

Carlisle Series

The Carlisle series consists of deep, very poorly drained soils that formed from decomposed woody, sedgy, and grassy plants. These soils occur throughout the county as nearly level areas and depressions that were once shallow ponds and bogs. Most areas are small, but there are large areas in the north-central part of the county. Representative profile—

0 to 30 inches, black muck; very friable.
30 to 44 inches +, dark-brown, fibrous and woody peat; friable.

Carlisle soils are very high in content of organic matter, and they have a high available moisture capacity. Permeability is moderately rapid. The reaction ranges from medium acid to neutral.

A high water table is the major limitation. If these soils are drained and fertilized, they are well suited to corn and to such specialty crops as sweet corn, mint, and potatoes.

Carlisle muck (0 to 2 percent slopes) (Ca).—This soil occurs as low depressions that range from 2 to 75 acres or more in size. A few small areas of Tawas muck underlain by sand at a depth of 12 to 42 inches were included in mapping.

A high water table is the major limitation. A combination of open ditches and tile is required if crops are grown. Most of the acreage is cropland. If drained, it can be cultivated intensively. Wind erosion is a hazard if the surface layer becomes dry and lacks protective vegetation. *Capability unit IIIw–8; woodland suitability group 23*

Celina Series

The Celina series consists of deep soils that formed in loam to light clay loam till. The native vegetation was deciduous forest. These soils are moderately well drained and nearly level or gently sloping. They are in the eastern part of the county. Representative profile—

0 to 10 inches, dark grayish-brown fine sandy loam; very friable.
10 to 14 inches, brown fine sandy loam; very friable.
14 to 21 inches, yellowish-brown loam; pale-brown mottles in the lower part; friable.
21 to 37 inches, yellowish-brown clay loam; light brownish-gray mottles; firm.
37 to 48 inches +, yellowish-brown, limy loam till; light brownish-gray mottles; friable.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is medium. Permeability is moderately slow. The reaction of the surface layer ranges from medium acid to slightly acid; that of the underlying layers ranges from strongly acid to slightly acid down to the limy till.

Most of the acreage is cultivated.

Celina fine sandy loam, 0 to 2 percent slopes (CbA).—This soil occurs as broad areas on the till plain, mostly in the southeastern part of the county. Generally there are many till pebbles and stones on the surface. Small areas of loam and small areas of Crosby and Metea soils were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. It may be droughty, especially during prolonged dry periods, although most of the rainfall is absorbed and runoff is slow. *Capability unit IIs–3; woodland suitability group 1*

Celina fine sandy loam, 2 to 6 percent slopes, moderately eroded (CbB2).—This soil occurs on short slopes along drainageways and in areas adjoining the Miami soils, which are upslope. The plow layer consists of the surface layer and a moderate amount of the yellowish-brown subsoil. Small areas of Miami soils were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. If it is cultivated intensively, contouring and other erosion control measures are generally needed. *Capability unit IIe-5; woodland suitability group 1*

Celina loam, 0 to 2 percent slopes (CeA).—This soil occurs as broad areas on the till plain where it adjoins Miami and Crosby soils. It generally is slightly downslope from the Miami soils. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of fine sandy loam and small areas of Crosby soils were included in mapping.

This soil has no serious limitations for crops commonly grown in the county. Most of the acreage is cropland, and it can be cultivated intensively. *Capability unit I-1; woodland suitability group 1*

Celina loam, 2 to 6 percent slopes, moderately eroded (CeB2).—This soil occurs on short slopes along drainageways and in areas downslope from Miami and Metea soils. It has a profile similar to the one described for the series, except for the texture of the surface layer. The plow layer consists of the original surface layer and a moderate amount of the yellowish-brown subsoil. Small areas of fine sandy loam and small areas of Miami soils were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. If it is cultivated intensively, contouring and other erosion control measures generally are needed. *Capability unit IIe-2; woodland suitability group 1*

Chelsea Series

The Chelsea series consists of deep, excessively drained soils, known locally as "blow sands" or "yellow sands." They formed in strongly acid sand in nearly level to steeply sloping areas. The native vegetation was deciduous forest. Chelsea soils commonly occur as dunes or ridges throughout the central and eastern two-thirds of the county. Representative profile—

- 0 to 5 inches, very dark grayish-brown fine sand; very friable.
- 5 to 45 inches, brown fine sand; loose.
- 45 to 70 inches +, layers of light yellowish-brown, loose fine sand, alternating with bands of dark-brown, friable loamy fine sand.

The natural fertility, the content of organic matter, and the available moisture capacity are low. Permeability is rapid.

These soils are subject to wind erosion if left without protective vegetation. Much of the acreage is woodland or permanent pasture.

Chelsea fine sand, 0 to 2 percent slopes (ChA).—This soil occurs as small, irregular knobs surrounded by Morocco and Berrien soils. It rarely makes up an entire field and, consequently, is farmed with those soils. Small areas of Berrien soils were included in mapping.

Although most of the rainfall is absorbed and runoff is slow, droughtiness is the major hazard. It severely limits the growth of corn and other crops that require a large amount of water. Wind erosion also is a severe hazard if the soil becomes dry and is left without a vegetative cover. Small grain and meadow crops are suitable. *Capability unit IIIs-1; woodland suitability group 17*

Chelsea fine sand, 2 to 6 percent slopes (ChB).—This soil adjoins the higher and steeper Chelsea soils and Plainfield soils on sand ridges. A few small, scattered areas of Berrien soils and Plainfield soils were included in mapping.

Although runoff is slow, droughtiness is the major limitation. It severely limits the growth of corn and other crops that require a large amount of water. Small grain and meadow crops are suitable, and Christmas trees grow well. Wind erosion is a severe hazard if the surface layer becomes dry and lacks a vegetative cover. *Capability unit IIIs-1; woodland suitability group 17*

Chelsea fine sand, 6 to 12 percent slopes (ChC).—This soil is on sand ridges where "blowouts" commonly occur. Small areas of Plainfield soils were included in mapping.

Erosion is the major hazard. Wind erosion can be very severe in areas that lack a vegetative cover. Christmas trees are commonly grown on this soil, and it is suitable as woodland or as wildlife habitats. *Capability unit VIIs-1; woodland suitability group 17*

Chelsea fine sand, 12 to 18 percent slopes (ChD).—This inextensive soil is on sand ridges. Small areas of Plainfield soils were included in mapping.

Erosion is the major hazard. Wind erosion is very severe in areas unprotected by vegetative cover. Christmas trees are commonly grown on this soil, and it is suitable as woodland and as wildlife habitats. *Capability unit VIIs-1; woodland suitability group 17*

Clay Pits

Clay pits (Cl) are areas in which the surface layer and subsoil have been stripped from the soil and used for the production of tile and for other purposes. The soil material is excavated to the limy (calcareous) layer, generally at a depth of 2 to 4 feet. Two such clay pits are in the old lakebed north of Francesville. *Capability unit VIIe-1; woodland suitability group 16*

Conover Series

The Conover series consists of deep, somewhat poorly drained soils that formed in loam to light clay loam till. The native vegetation was a mixture of prairie grass and deciduous forest. These soils occur as nearly level areas in the southeastern part of the county. Representative profile—

- 0 to 9 inches, very dark gray loam; friable.
- 9 to 13 inches, dark grayish-brown loam; yellowish-brown mottles; friable.
- 13 to 19 inches, dark grayish-brown clay loam; yellowish-brown mottles; friable.
- 19 to 28 inches, grayish-brown light clay loam; strong-brown mottles; friable.
- 28 to 42 inches +, mottled, grayish-brown and strong-brown, limy loam till; friable.

The natural fertility is medium, the content of organic matter is high, and the available moisture capacity is high. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

These soils have a seasonal high water table. If adequately drained and fertilized, they are well suited to corn and other grain crops.

Conover loam, 0 to 2 percent slopes (CmA).—This soil is on the till plain. It adjoins the low-lying, dark-colored Brookston soils and the lighter colored Crosby soils and is farmed with them because it rarely makes up an entire field. Pockets of Brookston soils and small areas of Crosby soils were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. A high water table is the major limitation. A combination of tile and surface drainage is necessary for crops. Including a deep-rooted legume in the cropping system improves soil drainage. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw–2; woodland suitability group 5*

Conover silt loam, 0 to 2 percent slopes (CnA).—This soil adjoins the low-lying Brookston soils and pockets of organic soils. It has a profile like the one described for the series, except for the texture of the surface layer. Small areas of loam and small areas of Brookston soils were included in mapping.

This soil has moderate limitations for crops commonly grown in the county. A high water table is the major limitation. Tile is necessary if crops are grown, and surface drainage is necessary in some areas. Growing a deep-rooted legume improves soil drainage. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw–2; woodland suitability group 5*

Corwin Series

The Corwin series consists of deep, moderately well drained soils that formed in loam to light clay loam till. The native vegetation was prairie grass. These soils occur as nearly level and gently sloping areas in the southwestern part of the county. Representative profile—

0 to 15 inches, very dark brown loam that grades to very dark grayish brown in the lower part; friable.
15 to 24 inches, dark yellowish-brown light clay loam; friable.
24 to 31 inches, yellowish-brown clay loam; pale-brown mottles; firm.
31 to 42 inches +, yellowish-brown, limy loam till; pale-brown mottles; friable.

The natural fertility is moderately high. The content of organic matter and the available moisture capacity are high. Permeability is moderately slow. The reaction of the surface layer ranges from medium acid to neutral, and that of the subsoil from strongly acid to medium acid.

Most of the acreage is cultivated.

Corwin loam, 0 to 2 percent slopes (CoA).—This soil is between the Odell soils, which are downslope, and the Parr soils, which are upslope. Small areas of fine sandy loam and small areas of Odell soils were included in mapping.

This soil has no serious limitations for crops grown in the county. Most of it is cropland, and it can be cultivated intensively. *Capability unit I–1; woodland suitability group 23*

Corwin silt loam, 0 to 2 percent slopes (CrA).—This soil is upslope from the Odell soils. It has a profile similar to the one described for the series, except for the texture of the surface layer. Generally, there are many till pebbles and stones on the surface. Small areas of loam and small areas of Odell soils were included in mapping.

This soil has no serious limitations for crops grown in the county. Most of the acreage is cropland that can be cultivated intensively. *Capability unit I–1; woodland suitability group 23*

Corwin silt loam, 2 to 6 percent slopes, moderately eroded (CrB2).—This soil occurs along drainageways and in areas that adjoin the Odell soils, which are downslope. It has a profile similar to the one described for the series, except for the texture of the surface layer. The plow layer consists of the surface layer and a moderate amount of the dark yellowish-brown subsoil. Small areas of loam were included in mapping.

This soil has moderate limitations for crops grown in the county. If cultivated intensively, contouring and other erosion control measures are generally needed. *Capability unit IIe–2; woodland suitability group 23*

Crosby Series

The Crosby series consists of deep, somewhat poorly drained soils, known locally as "yellow clay." They formed in loam to light clay loam till. The native vegetation was deciduous forest. These soils occur as nearly level and gently sloping areas in the eastern and south-central parts of the county. Representative profile—

0 to 8 inches, dark grayish-brown fine sandy loam; friable.
8 to 12 inches, pale-brown fine sandy loam; few yellowish-brown mottles; friable.
12 to 16 inches, pale-brown loam; yellowish-brown mottles; friable.
16 to 32 inches, dark grayish-brown clay loam; many grayish-brown mottles; firm.
32 to 42 inches +, yellowish-brown, limy loam till; many gray mottles; friable.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is medium. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from medium acid to slightly acid.

These soils have a seasonal high water table. If drained and fertilized, they are well suited to corn and other grain crops.

Crosby fine sandy loam, 0 to 2 percent slopes (CsA).—This soil occurs as small knobs surrounded by Brookston soils and as nearly level areas adjoining Aubbeenaubbee soils. It is farmed with those soils because it rarely makes up an entire field. A few, small, scattered areas that have limy till at a depth greater than 42 inches were included in mapping. Small areas of Aubbeenaubbee soils were also included.

A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage is necessary in some areas. Growing a deep-rooted legume improves drainage. Most of the acreage is cropland. If adequately drained, it is well suited to corn and other grain crops. *Capability unit IIIw-3; woodland suitability group 5*

Crosby loam, 0 to 2 percent slopes (CtA).—This soil occurs as broad areas on the till plain. It is between the Brookston soils, which are downslope, and the Miami soils, which are upslope. It has a profile similar to the profile described for the series, except for the texture of the surface layer. Small areas that have limy till at a depth greater than 42 inches were included in mapping, Small areas of Conover soils were also included.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage is required in some areas. Most of the acreage is cropland. If drained and fertilized, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 5*

Crosby silt loam, 0 to 2 percent slopes (CuA).—This soil occurs as broad areas on the till plain where it adjoins the Brookston soils, which are in depressions. It has a profile similar to the profile described for the series, except for the texture of the surface layer. Small areas of loam and small areas of Conover soils were included in mapping.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage also is required in some areas. Most of this soil is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 5*

Crosby silt loam, 2 to 6 percent slopes (CuB).—This soil is on short slopes along drainageways. Most of the slopes are 3 percent, and very little erosion has occurred. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small, moderately eroded areas were included in mapping.

A high water table is the major limitation, but only random tile lines are necessary in most areas. Most of the acreage is cropland. *Capability unit IIw-2; woodland suitability group 5*

Darroch Series

The Darroch soils are deep, somewhat poorly drained soils that formed in lakebed deposits of layered silt and fine sand under prairie grass. These soils occur as nearly level areas in the southwestern part of the county. Representative profile—

0 to 8 inches, very dark brown silt loam; friable.
8 to 12 inches, dark yellowish-brown heavy silt loam; friable.
12 to 30 inches, dark grayish-brown, gritty silty clay loam; dark yellowish-brown and yellowish-brown mottles; friable and firm in lower part.
30 to 36 inches, yellowish-brown, limy silt; gray mottles; firm.
36 to 52 inches +, pale-brown, limy fine sand; yellowish-brown mottles; friable.

The natural fertility is medium, the content of organic matter is high, and the available moisture capacity is medium to high. Permeability is moderately slow in the subsoil and slow to rapid in the substratum. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

These soils have a seasonal high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Darroch loam (0 to 2 percent slopes) (Da).—This soil is along drainageways. It adjoins the Rensselaer soils that are in depressions and the gently sloping Foresman soils. It has a profile similar to the profile described for the series, except for the texture of the surface layer. Small areas of fine sandy loam and small areas of Foresman soils were included in mapping.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation, and tile drainage is necessary if crops are grown. Permeability is moderately slow. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Darroch loam, clay substratum (0 to 2 percent slopes) (Dc).—This soil occurs as nearly level areas adjoining the Strole soils. It also adjoins the Rensselaer and Montgomery soils, which are in depressions. The profile of this soil differs from the representative profile of the series in having a loam surface layer and a silty clay or clay substratum. The substratum is at a depth of 24 to 48 inches. Small areas of silt loam and small areas that do not have a clay substratum were included in mapping.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation. Permeability is slow. Because of the heavy substratum, closer spacing of tile is needed than in the other Darroch soils. Surface drainage also is required in some areas. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Darroch silt loam (0 to 2 percent slopes) (Ds).—This soil adjoins Rensselaer soils that are in depressions. Small areas of loam and small areas of Rensselaer soils were included in mapping.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation, and tile drainage is necessary if crops are grown. Surface drainage also is required in some areas. Permeability is moderately slow. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Edwards Series

The Edwards series consists of deep, very poorly drained soils that formed in organic material derived from decomposed woody and sedgy plants. The organic layer is 12 to 42 inches thick and is underlain by highly calcareous marl. These soils occur throughout the county as small, nearly level areas and depressions that were once the sites of shallow ponds and bogs. Representative profile—

0 to 19 inches, black muck; very friable.
19 to 50 inches +, light-gray marl containing many small shell fragments; very friable; calcareous.

Edwards soils are very high in content of organic matter and high in available moisture capacity. Permeability is moderately rapid in the organic layer and variable in the marl. The reaction of the organic layer ranges from medium acid to mildly alkaline.

Wetness is the major limitation. If crops are grown, a good drainage system is necessary, but outlets are difficult to obtain in these low-lying soils. Open ditches are required. If drained and fertilized, these soils are well suited to sweet corn, mint, potatoes, and other specialty crops.

Edwards muck (0 to 2 percent slopes) (Ed).—This soil occurs as low depressions throughout the county. A few small, scattered areas of Tawas soil, which has sand at a depth of 12 to 42 inches, were included in mapping. Also included were areas that have less than 12 inches of muck over the marl.

Most of the acreage is cropland. Areas that are difficult to drain are used for permanent pasture. Wind erosion is a hazard if the surface layer becomes dry and has no vegetative cover. *Capability unit IVw-3; woodland suitability group 23*

Eel Series

The Eel series consists of deep, moderately well drained soils that formed in material deposited by flowing water. They occur as nearly level areas on bottom lands of Mill Creek and the Tippecanoe River. Representative profile—

0 to 7 inches, dark grayish-brown light loam; friable.
7 to 21 inches, dark grayish-brown heavy loam; few yellowish-brown iron stains; friable.
21 to 30 inches +, dark-brown and brown fine sandy loam; dark-gray mottles; friable.

The natural fertility is medium to high, the content of organic matter is medium, and the available moisture capacity is medium. Permeability is moderate. The reaction from one area to another ranges from slightly acid to mildly alkaline.

These soils generally do not require tile drainage, but they are subject to flooding, which may limit the kinds of crops to be grown. Corn and soybeans are the principal crops.

Eel loam (0 to 2 percent slopes) (Em).—This soil occurs mostly as narrow areas on the Tippecanoe River bottom lands. It is at slightly higher elevations than the Sloan soils. Small areas of Abscota soils and small areas of fine sandy loam were included in mapping.

This soil is flooded occasionally. The hazard is greatest from December through June; consequently, a fall-seeded grain or meadow crop is impractical. A high water table is a hazard in some areas, and tile drainage is necessary if crops are grown. Most of the acreage is woodland. The small acreage that is used for crops can be cultivated intensively. *Capability unit IIw-7; woodland suitability group 8*

Foresman Series

The Foresman series consists of dark-colored, deep, moderately well drained soils that formed in lakebed deposits of limy silt and fine sand under prairie grass. These soils occur as small, nearly level areas in the southwestern part of the county.

Typically, the Foresman soils have a loam surface layer, but some of the soils have a fine sandy loam surface layer. Therefore, two profiles are described. Profile of Foresman loam—

0 to 14 inches, very dark gray loam; friable.
14 to 28 inches, light olive-brown heavy loam and clay loam; grayish-brown and brownish-yellow mottles in the lower part; friable.
28 to 36 inches, mottled, grayish-brown and brownish-yellow heavy clay loam; firm.
36 to 44 inches +, limy, light olive-gray silt and dark-gray fine sand; friable.

Profile of Foresman fine sandy loam—

0 to 10 inches, black fine sandy loam; friable.
10 to 35 inches, yellowish-brown light fine sandy loam that grades to loamy fine sand in the lower part; strong-brown and pale-brown mottles in the lower part; very friable.
35 to 40 inches, light-gray light sandy clay loam; yellowish-brown mottles; friable.
40 to 47 inches, dark yellowish-brown fine sandy loam to loamy fine sand that grades to light yellowish brown in the lower part; very friable.
47 to 50 inches +, light-gray, layered, limy silt and lenses of very fine sand; many yellowish-brown and light olive-brown mottles; firm.

The natural fertility is medium. The content of organic matter is high in the loam and medium to high in the fine sandy loam. The available moisture capacity is high in the loam and medium in the fine sandy loam. The loam has moderately slow permeability in the subsoil and generally moderate permeability in the underlying layer. The fine sandy loam has moderate permeability. The reaction of the loam ranges from medium acid to neutral; that of the fine sandy loam ranges from strongly acid to neutral.

Foresman soils are well suited to cultivated crops.

Foresman loam (0 to 2 percent slopes) (Fo).—This soil adjoins Darroch soils. Small areas of fine sandy loam and small areas of Darroch soils were included in mapping. Also included were small areas underlain by silty clay or clay at a depth of 30 to 42 inches.

This soil has no serious limitations for most crops commonly grown in the county. Most of the acreage is cropland, and it can be cultivated intensively. *Capability unit I-1; woodland suitability group 23*

Foresman fine sandy loam, sandy variant (0 to 2 percent slopes) (Ff).—This soil is at a slightly higher elevation than the closely associated Darroch soils. Small areas in which the slope is 3 percent and small areas of loamy fine sand were included in mapping. Also included were small areas underlain by clay at a depth of 36 to 48 inches.

This soil has moderate limitations for most crops commonly grown in the county. It tends to be droughty, even though most of the rainfall is absorbed and runoff is slow. Wind erosion is a hazard if the soil is dry and is not protected by vegetation. Most of the acreage is cropland. *Capability unit IIs-2; woodland suitability group 23*

Fox Series

The Fox series consists of deep, well-drained soils that formed in loamy outwash material underlain by limy sand and gravel at a depth of 24 to 42 inches. The native vegetation was deciduous forest. These soils occur as nearly level areas on terraces along the Tippecanoe River and on kames in the southern part of the county. Representative profile—

0 to 5 inches, dark grayish-brown sandy loam; friable.
5 to 9 inches, brown sandy loam; friable.
9 to 26 inches, yellowish-brown, gravelly heavy sandy loam that grades to strong-brown gravelly sandy clay loam in the lower part; friable in the upper part to firm in the lower part.
26 to 35 inches, reddish-brown gravelly clay loam that grades to gravelly heavy clay loam in the lower part; firm.
35 to 42 inches +, light-gray, limy sand and gravel; loose.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is low. Permeability is moderate in the subsoil and rapid in the underlying sand and gravel. The reaction of the surface layer and subsoil ranges from very strongly acid to neutral.

Most of the acreage is cultivated.

Fox sandy loam, 0 to 2 percent slopes (FsA).—This soil is on stream terraces. It adjoins the Metea and Miami soils, which are upslope, and is farmed with those soils because it is in small areas not more than 5 acres in size. Small areas of loam and areas that have a dark-colored surface layer were included in mapping.

This soil has severe limitations for crops. Droughtiness, the major limitation, severely limits the growth of corn and other crops that require a large amount of water. Meadow crops and small grain are suitable. *Capability unit IIIs–1; woodland suitability group 2*

Gilford Series

The Gilford series consists of deep, very poorly drained soils, known locally as "black sands." These soils formed in sandy loam to loam outwash material, 42 to 66 inches thick, over neutral to limy sand and gravel. Stratified fine sand and silt may occur in the underlying material. The native vegetation was marsh grass. These soils occur as nearly level areas and depressions throughout the county. Representative profile—

0 to 12 inches, black to very dark gray fine sandy loam; very friable.
12 to 46 inches, gray heavy fine sandy loam and light sandy loam; friable.
46 to 66 inches +, gray sand and fine gravel; loose.

The natural fertility is high. The content of organic matter is high, and the available moisture capacity is medium. Permeability is moderately rapid. The reaction of the surface layer and subsoil ranges from medium acid to neutral.

These soils have a high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Gilford fine sandy loam (0 to 2 percent slopes) (Gf).—This soil is in glacial channels and broad depressions on the outwash plain. It adjoins the somewhat poorly drained Brady soils and the moderately well drained Bronson soils. Small areas of Brady soils and Maumee soils were included in mapping.

A high water table is the major limitation. A combination of open ditches and tile is required if crops are grown. Controlling the drainage is important to avoid lowering the water table too much. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw–1; woodland suitability group 21*

Gilford loam (0 to 2 percent slopes) (Gm).—This soil has a finer textured surface layer and subsoil than those in the representative profile of the series. Small areas of silt loam and small areas of Rensselaer soils were included in mapping.

A high water table is the major limitation. A combination of open ditches and tile is required if crops are grown. Controlling the drainage is important to avoid lowering the water table too much. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw–4; woodland suitability group 21*

Gilford loam, ferruginous variant (0 to 2 percent slopes) (Gv).—The profile of this soil differs from the profile described for the series in having a finer textured surface layer and an accumulation of soft "bog iron" in the subsoil. The iron is evident on the surface of the soil as hard, reddish concretions up to 4 inches in diameter. *Capability unit IIw–4; woodland suitability group 21*

Homer Series

The Homer series consists of deep, somewhat poorly drained soils that formed in 36 to 50 inches of loamy outwash material over limy sand and gravel. The native vegetation was deciduous forest. These soils occur as nearly level areas in the southeastern part of the county. Representative profile—

0 to 7 inches, dark grayish-brown sandy loam; friable.
7 to 11 inches, brown fine sandy loam; yellowish-brown mottles; friable.
11 to 14 inches, brown loam; many yellowish-brown mottles; friable.
14 to 43 inches, grayish-brown and gray clay loam and sandy clay loam, gravelly in the lower part; many yellowish-brown mottles; firm.
43 to 60 inches +, dark-gray and gray very coarse sand and fine gravel; limy at 55 inches; loose.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is medium. Permeability is moderately slow in the subsoil and rapid in the underlying layers. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

These soils have a seasonal high water table. Artificial drainage is necessary if crops are grown.

Homer sandy loam (0 to 2 percent slopes) (Ho).—This soil is between Gilford soils, which are downslope, and Aubbeenaubbee soils, which are upslope. It is farmed with those soils because it rarely makes up an entire field. Small areas of Aubbeenaubbee soils were included in mapping.

This soil has moderate limitations for most crops grown in the county. A high water table is the major limitation, and drainage is necessary if crops are grown. Open ditches are satisfactory, but tile can be used. Most of the acreage is cropland. *Capability unit IIIw–4; woodland suitability group 5*

Hoopeston Series

The Hoopeston series consists of deep, somewhat poorly drained soils that formed in lakebed deposits of layered fine and very fine sand mixed with some silt. The native vegetation was prairie grass. These soils occur as nearly level areas in the southwestern part of the county. Representative profile—

0 to 12 inches, black and very dark gray fine sandy loam; friable.
12 to 23 inches, dark grayish-brown fine sandy loam; many yellowish-brown mottles; friable.
23 to 33 inches, brown sandy loam to light sandy clay loam; many strong-brown and dark grayish-brown mottles; firm.
33 to 38 inches, mottled pale-brown and strong-brown fine sand and very fine sand; loose.
38 to 50 inches +, mottled light brownish-gray and very pale brown, limy fine sand and very fine sand; loose.

The natural fertility is medium, the content of organic matter is high, and the available moisture capacity is medium. Permeability is moderate in the subsoil and moderately rapid in the underlying material. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

These soils have a seasonal high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Hoopeston fine sandy loam (0 to 2 percent slopes) (Hp).—This soil adjoins the Rensselaer soils, which are downslope. Small areas of loam and small areas of Foresman soils were included in mapping.

This soil has moderate limitations for crops grown in the county. A high water table is the major limitation, and tile drainage is necessary if crops are grown. Most of the acreage is cropland. *Capability unit IIIw-4; woodland suitability group 23*

Maumee Series

The Maumee series consists of deep, very poorly drained soils, known locally as "black sands." These soils formed in neutral to calcareous sand under marsh grass. They occur as nearly level areas and depressions, mostly in the northern and central parts of the county. Representative profile—

0 to 16 inches, black fine sandy loam; very friable.
16 to 28 inches, grayish-brown loamy fine sand; few yellowish-brown mottles; very friable.
28 to 50 inches +, gray fine sand; few yellowish-brown mottles; loose.

The natural fertility is medium, the content of organic matter is high, and the available moisture capacity is low. Permeability is rapid. The reaction of the surface layer and subsoil is medium acid to neutral.

Although these soils have a high water table, they are well suited to corn and other grain crops if drained and fertilized.

Maumee fine sandy loam (0 to 2 percent slopes) (Ma).—This soil occurs as broad depressions that are as large as 75 acres in size. It adjoins Gilford and Tawas soils. A few, small, scattered areas of loamy fine sand and small areas of Gilford soils were included in mapping.

A high water table is the major limitation, and open ditches supplemented by tile are required if crops are grown. Controlling the drainage is important because it is possible to overdrain this soil by lowering the water table too much. Wind erosion also is a hazard if there is no protective vegetation. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw-1; woodland suitability group 21*

Maumee fine sandy loam, ferruginous variant (0 to 2 percent slopes) (Md).—This soil has an accumulation of soft "bog iron" in the solum. Otherwise, it has a profile similar to the one described for the series. The iron is evident on the surface of the soil in the form of hard, reddish concretions as large as 4 inches in diameter.

A high water table is the major limitation. Wind erosion is a hazard if the surface layer has no protective vegetation. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw-1; woodland suitability group 21*

Maumee loamy fine sand (0 to 2 percent slopes) (Me).—This soil adjoins Newton and Morocco soils in depressions. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of Newton soils were included in mapping.

A high water table is the major limitation. Open ditches supplemented by tile are necessary if crops are grown. Controlling drainage is important because the water table can be lowered too much. Wind erosion also is a hazard if the soil has no protective vegetation. Most of this soil is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw-1; woodland suitability group 21*

Maumee mucky fine sandy loam (0 to 2 percent slopes) (Mf).—This soil has a profile similar to the one described for the series, except that the plow layer of this soil is more than 15 percent organic matter. Most areas adjoin the Carlisle and Tawas soils.

A high water table is the major limitation. Wind erosion is a hazard if the soil is without protective vegetation. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw-1; woodland suitability group 21*

Mermill Series

The Mermill series consists of deep, very poorly drained soils that formed in 24 to 36 inches of medium-textured material over moderately fine textured material. The native vegetation was marsh grass. These soils are around Francesville and Medaryville. Representative profile—

0 to 13 inches, black or very dark gray silt loam; friable.
13 to 31 inches, gray and olive-brown clay loam and sandy clay loam; some mottles; friable.
31 to 42 inches, mottled, yellowish-brown, gray, and light olive-brown silty clay loam; very firm; limy.
42 to 50 inches +, mottled, yellowish-brown, gray, and light olive-brown silty clay loam; massive; firm; limy.

The natural fertility, the content of organic matter, and the available moisture capacity are high. Permeability is moderately slow in the subsoil and slow in the lower horizons. The reaction is slightly acid to neutral in the upper part and limy in the lower part.

Wetness is the major limitation, but these soils are well suited to corn and other grain crops if drained and fertilized.

Mermill loam (0 to 2 percent slopes) (Mh).—This soil is in small depressions. It adjoins the Rensselaer and Montgomery soils in an area north of Francesville. It has a profile like the one described for the series, except for the texture of the surface layer. A few small, scattered areas of silt loam and small areas of Rensselaer soils were included in mapping.

A high water table is the major limitation. Runoff is very slow; in some areas it is ponded. Close spacing of tile lines is required because of the heavy subsoil. Surface drains also are needed in many areas. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-1; woodland suitability group 11*

Mermill silt loam (0 to 2 percent slopes) (Mk).—This soil occurs in narrow, fingerlike depressions and in relatively broad, flat areas. It adjoins Blount and Seward soils in an area northwest of Medaryville. A few, small scattered areas of Gilford soils were included in mapping.

A high water table is the major limitation. Runoff is very slow or ponded, and surface drainage is required in many areas. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-1; woodland suitability group 11*

Metea Series

The Metea series consists of deep, well drained and moderately well drained soils that formed in 20 to 36 inches of sandy material over loam till. The native vegetation was deciduous forest. These soils occur as nearly level and gently sloping areas, mostly in the eastern and southeastern parts of the county. Representative profile—

0 to 8 inches, very dark grayish-brown loamy fine sand; very friable.
8 to 32 inches, yellowish-brown fine sand; loose.
32 to 44 inches, dark-brown clay loam; friable.
44 to 50 inches +, brown loam till; friable.

The natural fertility and the content of organic matter are low, and the available moisture capacity is low to medium. Permeability is rapid in the sandy surface layer and moderately slow in the subsoil. The reaction is strongly acid to slightly acid.

Metea soils are largely in cultivation. They are suited to row crops, to small grain, and to grass-legume mixtures (fig. 3).

Metea loamy fine sand, 0 to 2 percent slopes (MlA).—This soil adjoins Aubbeenaubbee and Chelsea soils on the till plain. Small areas of Aubbeenaubbee soils were included in mapping.

Droughtiness is the major limitation. This soil is suited to corn and soybeans and is well suited to meadow crops and small grain. *Capability unit IIIs-1; woodland suitability group 15*

Figure 3.—Harvesting soybeans on Metea loamy fine sand, 0 to 2 percent slopes, a class IIIs soil.

Metea loamy fine sand, 2 to 6 percent slopes (MlB).—This soil occurs as small knobs adjoining Chelsea soils on the till plain. Little erosion has occurred. Small, moderately eroded areas and small areas of Chelsea soils were included in mapping.

Erosion is the major hazard, and drought also is a hazard. If this soil is cultivated intensively, contouring and other erosion control measures are needed. It is suited to corn and soybeans and is well suited to meadow crops and small grain. *Capability unit IIIe-12; woodland suitability group 15*

Miami Series

The Miami series consists of deep soils that formed in loam to light clay loam till. The native vegetation was deciduous forest. These soils are well drained. They occur as nearly level and moderately sloping areas in the eastern part of the county. Representative profile—

0 to 8 inches, dark grayish-brown fine sandy loam; very friable.
8 to 11 inches, brown heavy fine sandy loam; friable.
11 to 18 inches, yellowish-brown heavy loam; friable.
18 to 36 inches, yellowish-brown clay loam that grades to light clay loam in the lower part; firm.
36 to 42 inches +, yellowish-brown limy loam till; friable.

The natural fertility is medium, the content of organic matter is low to medium, and the available moisture capacity is medium. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

Most of the acreage is cultivated.

Miami fine sandy loam, 0 to 2 percent slopes (MmA).—This soil is in broad areas adjoining Celina and Metea soils on the till plain. Generally, there are many till pebbles and stones on the surface, and stones as large as 3 feet in diameter are evident along many fence rows. Small areas of Metea soils were included in mapping. Also included were areas in which calcareous loam till is at a depth greater than 42 inches.

This soil has moderate limitations for crops grown in the county. Although most of the rainfall is absorbed and runoff is slow, the soil tends to be droughty. Most of the acreage is cropland. *Capability unit IIs-3; woodland suitability group 1*

Miami fine sandy loam, 2 to 6 percent slopes (MmB).—This soil adjoins Metea soils on the till plain. Generally, there are many till pebbles and stones on the surface. Little erosion has occurred. Small, moderately eroded areas and small areas of Metea soils were included in mapping.

This soil has moderate limitations for crops grown in the county. If it is cultivated intensively, contouring and other erosion control measures are generally needed. *Capability unit IIe-5; woodland suitability group 1*

Miami fine sandy loam, 2 to 6 percent slopes, moderately eroded (MmB2).—This soil adjoins Metea soils on the slopes of drainageways and on relatively long slopes of the till plain. The plow layer consists of the surface layer mixed with a moderate amount of the yellowish-brown subsoil. Small, severely eroded areas and small areas of Metea soils were included in mapping.

This soil has moderate limitations for crops grown in the county. If it is cultivated intensively, contouring and other erosion control measures are generally needed. *Capability unit IIe-5; woodland suitability group 1*

Miami fine sandy loam, 6 to 12 percent slopes, moderately eroded (MmC2).—This soil is on the short slopes of drainageways and on the higher ridges of the till plain. The plow layer consists of the surface layer mixed with a moderate amount of the yellowish-brown subsoil. Small, severely eroded areas and small areas of loam were included in mapping.

This soil has severe limitations for crops. It is suited to small grain and meadow crops. If it is used for row crops, erosion control measures are necessary. *Capability unit IIIe-5; woodland suitability group 1*

Miami loam, 0 to 2 percent slopes (MnA).—This soil is in broad areas adjoining the Metea and Celina soils on the till plain. It has a profile similar to the one described for the series except for the texture of the surface layer. Generally, there are many till pebbles and stones on the surface, and stones as large as 3 feet in diameter are evident along many fence rows. Small areas of fine sandy loam and small areas of Celina soils were included in mapping.

This soil has no serious limitations for crops grown in the county. Most of it is cropland, and it can be cultivated intensively. *Capability unit I-1; woodland suitability group 1*

Miami soils, 6 to 12 percent slopes, severely eroded (MoC3).—These soils are in small areas on short slopes of drainageways and on high ridges of the till plain. Erosion has removed most of the original surface layer. The plow layer, in most areas, consists of the yellowish-brown clay loam subsoil mixed with what is left of the surface soil. In some spots, however, much of the original surface soil remains.

These soils have very severe limitations for crops. *Capability unit IVe-5; woodland suitability group 1*

Montgomery Series

The Montgomery series consists of deep, very poorly drained soils, commonly referred to as "black gumbo." They formed in lakebed deposits of limy silty clay and clay under prairie grass. These soils occur as small, nearly level areas and depressions in the southwestern part of the county. Representative profile—

0 to 12 inches, very dark brown silty clay; firm.
12 to 30 inches, gray and grayish-brown silty clay; light olive-brown mottles; firm to very firm.
30 to 48 inches +, gray, limy silty clay; very firm.

The natural fertility, the content of organic matter, and the available moisture capacity are high. Permeability is slow. The reaction of the surface layer and subsoil is predominantly neutral; in some areas the reaction of the surface layer is slightly acid.

These soils have a high water table. If drained and fertilized, however, they are well suited to corn and other grain crops.

Montgomery silty clay (0 to 2 percent slopes) (Mp).—This soil is in narrow, fingerlike depressions and in broad depressions adjoining Rensselaer and Strole soils, which are upslope. A few, small, scattered areas of Rensselaer and Strole soils were included in mapping.

A high water table is the major limitation, and runoff is very slow or ponded. Consequently, this soil remains wet until late in spring and is commonly plowed in the fall. A combination of tile and surface drainage is necessary if crops are grown. The frequent use of a green-manure crop promotes better drainage and improves soil tilth. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIIw-2; woodland suitability group 11*

Morocco Series

The Morocco series consists of deep, somewhat poorly drained soils that formed in very strongly acid and strongly acid sand under deciduous forest. These soils occur as nearly level areas throughout the northern and central parts of the county. Representative profile—

0 to 8 inches, dark grayish-brown loamy fine sand; very friable.
8 to 30 inches, mottled reddish-yellow, pale-brown, gray, and red, medium sand; loose.
30 to 48 inches +, pale-brown fine sand, mottled with gray, yellow, and reddish yellow; loose.

The natural fertility is low, the content of organic matter is low to medium, and the available moisture capacity is low. Permeability is rapid. The reaction is very strongly acid or strongly acid.

These soils have a seasonal high water table during spring and may need artificial drainage. Areas that lack adequate drainage are in permanent pasture or woodlots.

Morocco loamy fine sand (0 to 2 percent slopes) (Mr).—This soil adjoins Maumee and Newton soils, which are in depressions, and Berrien soils, which are upslope. Small areas of Berrien soils were included in mapping.

A high water table is the major limitation. Open ditches, supplemented in some areas by tile, may be necessary if crops are grown. Drainage must be controlled, however, to avoid lowering the water table too much and making the soil droughty. Most of the acreage is cropland. *Capability unit IVw-2; woodland suitability group 20*

Newton Series

The Newton series consists of deep, very poorly drained soils, known locally as "black sands." These soils formed in very strongly acid and strongly acid sand under marsh grass. They are in depressions between sand ridges in the northern part of the county. Representative profile—

0 to 16 inches, black loamy fine sand that grades to very dark grayish brown in the lower part; very friable.
16 to 25 inches, light brownish-gray fine sand; many dark-gray mottles; loose.
25 to 54 inches +, pale-brown and grayish-brown sand; loose.

The natural fertility is low, the content of organic matter is high, and the available moisture capacity is low. Permeability is rapid. The reaction is strongly acid.

These soils have a high water table, but they are easily tilled and are well suited to crops if artificial drainage is installed. Areas that are not adequately drained for crops are used for permanent pasture or woodlots.

Newton loamy fine sand (0 to 2 percent slopes) (Nf).—This soil is in depressions between areas of Plainfield soils, which are on sand ridges. It also adjoins Maumee soils. A few, small, scattered areas of Maumee soils were included in mapping.

A high water table is the major limitation, and a combination of open ditches and tile is necessary if crops are grown. Controlling the drainage is important, however, for this soil can be overdrained if the water table is lowered too much. Wind erosion also is a hazard if the soil is without protective vegetation. *Capability unit IVw-1; woodland suitability group 21*

Odell Series

The Odell series consists of somewhat poorly drained soils that formed in loam to light clay loam till under prairie grass. These soils occur as nearly level areas in the southwestern part of the county. Representative profile—

0 to 14 inches, very dark brown silt loam that grades to very dark grayish brown in the lower part; friable.
14 to 26 inches, very dark grayish-brown and dark grayish-brown clay loam; many yellowish-brown mottles; firm.
26 to 40 inches +, yellowish-brown, limy loam till; many light brownish-gray mottles; friable.

The natural fertility, the content of organic matter, and the available moisture capacity are high. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from medium acid to neutral.

These soils have a seasonal high water table, but they are well suited to corn and other grain crops if they are drained and fertilized.

Odell loam (0 to 2 percent slopes) (Od).—This soil is between the Brookston soils, which are downslope, and the Corwin soils, which are upslope. It has a profile similar to the profile described for the series, except for the texture of the surface layer. A few, small, scattered areas of fine sandy loam and small areas of Corwin soils were included in mapping.

A high water table is the major limitation. Tile drainage is necessary if crops are grown, and surface drainage is necessary in some areas. Including a deep-rooted legume in the cropping system helps to improve drainage. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Odell silt loam (0 to 2 percent slopes) (Oe).—This soil adjoins the Brookston soils, which are downslope. Small areas of loam and small areas of Brookston soils were included in mapping. Also included were small areas in which limestone is at a depth of 18 to 42 inches.

A high water table is the major limitation of this soil. Tile drainage is necessary if crops are grown, and surface drainage is necessary in some areas. Including a deep-rooted legume in the cropping system helps to improve drainage. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Oshtemo Series

The soils of the Oshtemo series are deep, well-drained sandy soils that formed in sandy loam and loamy sand outwash. They are underlain, at a depth of 42 to 70 inches or more, by limy sand and gravel or stratified fine sand and silt. The native vegetation was deciduous forest. These soils occur as nearly level to moderately sloping areas on the terraces along Mill Creek and the

Tippecanoe River and in small scattered areas throughout the eastern part of the county. Representative profile—

0 to 9 inches, dark-brown loamy sand; very friable.
9 to 32 inches, yellowish-brown loamy sand; very friable.
32 to 49 inches, dark yellowish-brown gravelly loamy sand that grades to gravelly sandy loam in the lower part; friable.
49 to 58 inches, dark grayish-brown gravelly loamy sand that grades to gravelly sandy loam in the lower part; friable.
58 to 65 inches +, dark grayish-brown, limy sand and gravel; loose.

The natural fertility, the content of organic matter, and the available moisture capacity are low. Permeability is rapid in the surface layer and moderately rapid in the subsoil. The reaction of the surface layer and subsoil ranges from very strongly acid to neutral.

Most of the nearly level and gently sloping areas are cultivated.

Oshtemo fine sandy loam, loamy substratum, 0 to 2 percent slopes (OfA).—This soil adjoins the Brady and Gilford soils, which are downslope. The surface layer and subsurface layer are finer textured than those in the representative profile of the series. Also, this soil is underlain by stratified fine sand and silt. Small areas of loamy fine sand and areas that are mottled at a depth of 18 to 30 inches were included in mapping.

This soil has moderate limitations for crops grown in the county. It may be droughty, although runoff is slow and most of the rainfall is absorbed. Most of the acreage is cropland. *Capability unit IIIs–1; woodland suitability group 17*

Oshtemo fine sandy loam, loamy substratum, 2 to 6 percent slopes (OfB).—This soil is on long slopes in association with the Brady and Gilford soils. The surface layer and subsurface layer are finer textured than those in the representative profile of the series. Also, this soil is underlain by stratified fine sand and silt. Very little erosion has occurred, although moderately eroded areas were included in mapping.

This soil has moderate limitations for crops grown in the county. Erosion is the major hazard, and the soil may be droughty. If it is cultivated intensively, contouring and other erosion control measures are generally needed. Most of the acreage is cropland. *Capability unit IIIe–12; woodland suitability group 17*

Oshtemo loamy sand, 0 to 2 percent slopes (OhA).—This soil is on outwash terraces. It is between Bronson soils, which are downslope, and Chelsea soils, which are upslope. The areas range from 3 to 30 acres in size. Small areas of sandy loam were included in mapping. Also included were small areas in which limy sand and gravel occur at a depth less than 42 inches.

This soil has very severe limitations for crops. Droughtiness is the major limitation. Although most of the rainfall is absorbed and runoff is slow, corn and other crops that require large amounts of water may be damaged during prolonged dry periods. Most of this soil is cropland, and it is suited to meadow crops and small grain. *Capability unit IIIs–1; woodland suitability group 17*

Oshtemo loamy sand, 2 to 6 percent slopes (OhB).—This soil is on gently sloping outwash terraces and on short slopes around drainageways. Little erosion has occurred. Small areas of sandy loam and some moderately eroded areas were included in mapping.

This soil has very severe limitations for crops. Droughtiness is the major limitation. Corn and other crops that require large amounts of water may be damaged during prolonged dry periods. Most of the acreage is cropland. Meadow crops and small grain are suitable. *Capability unit IIIe–12; woodland suitability group 17*

Oshtemo loamy sand, 6 to 12 percent slopes (OhC).—This soil is on short slopes along drainageways and on breaks of outwash terraces. Little erosion has occurred. Moderately eroded areas and small areas in which slopes exceed 12 percent were included in mapping.

Droughtiness is the major limitation, and erosion is a hazard. If this soil is cultivated, erosion control measures are needed. Most of the acreage is used for permanent pasture or woodlots. Little of it has been cultivated. *Capability unit IIIe–12; woodland suitability group 17*

Oshtemo loamy fine sand, loamy substratum, 0 to 2 percent slopes (OmA).—This soil adjoins the lower lying Brady soils. It is underlain by stratified fine sand and silt. Otherwise, it has a profile similar to the one described for the series. Areas in which mottling occurs at a depth of 18 to 30 inches were included in mapping.

This soil has very severe limitations for crops. Droughtiness is the major limitation. Although most of the rainfall is absorbed and runoff is slow, corn and other crops that require a large amount of water may be damaged during prolonged dry periods. Most of the acreage is cropland. Small grain and meadow crops are suitable. *Capability unit IIIs–1; woodland suitability group 17*

Oshtemo loamy fine sand, loamy substratum, 2 to 6 percent slopes (OmB).—This soil occurs with Brady soils on small knobs and in sloping areas along drainageways. It is underlain by stratified fine sand and silt. Otherwise, it has a profile similar to the one described for the series. Little erosion has occurred, but some moderately eroded areas were included in mapping.

This soil has very severe limitations for crops. It is droughty, but meadow crops and small grain can be grown. Most of the acreage is cropland. *Capability unit IIIe–12; woodland suitability group 17*

Parr Series

The Parr series consists of deep, well-drained soils that formed in loam to light clay loam till under prairie grass. These soils occur as nearly level and gently sloping areas in the southwestern part of the county. Representative profile—

0 to 13 inches, very dark grayish-brown loam; friable.
13 to 17 inches, dark yellowish-brown loam; friable.
17 to 33 inches, dark-brown heavy loam that grades to clay loam in the lower part; friable in the upper part and firm in the lower part.
33 to 42 inches +, yellowish-brown, limy loam till; light brownish-gray mottles; friable.

The natural fertility is moderately high, the content of organic matter is high, and the available moisture capacity is medium to high. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from strongly acid to neutral.

Parr soils are largely under cultivation.

Parr loam, 2 to 6 percent slopes, moderately eroded (PaB2).—This soil adjoins Corwin and Odell soils, which are downslope. The plow layer consists of the surface layer mixed with a moderate amount of dark yellowish-brown subsoil. Small slightly eroded areas and small areas of Corwin soils were included in mapping. A small acreage of this soil is underlain by limestone bedrock at a depth of 24 to 42 inches.

This soil has moderate limitations for crops grown in the county. If it is cultivated intensively, contouring and other erosion control measures are generally needed. *Capability unit IIe-2; woodland suitability group 23*

Plainfield Series

The Plainfield series consists of deep, excessively drained soils, known locally as "blow sand" or "yellow sand." These soils formed in strongly acid or very strongly acid sand under deciduous forest. They commonly occur as nearly level to steeply sloping areas on sand ridges throughout the county. Representative profile—

1 inch to 0, partly decomposed leaves and organic matter.
0 to 8 inches, very dark grayish-brown fine sand that grades to yellowish brown in the lower part; loose.
8 to 26 inches, yellowish-brown fine sand; loose.
26 to 60 inches +, yellow fine sand; loose.

The content of organic matter is low, and the available moisture capacity is very low. Permeability is rapid. The reaction is very strongly acid or strongly acid.

Plainfield soils are mostly in forest. Some small areas are cultivated. Because of the very low available moisture capacity, these soils are not generally suited to row crops. Wind erosion is a hazard in unprotected areas.

Plainfield fine sand, 0 to 2 percent slopes (PlA).—This soil occurs as small, irregular knobs within larger areas of Morocco soils and Berrien soils. It is farmed with those soils because it rarely makes up an entire field. Small areas of Berrien soils were included in mapping.

This soil has very severe limitations for crops. Although most of the rainfall is absorbed and runoff is slow, droughtiness may limit the growth of corn and other crops that require a large amount of water. Meadow crops and small grain are suitable. *Capability unit IVs-1; woodland suitability group 17*

Plainfield fine sand, 2 to 6 percent slopes (PlB).—This soil is on sand ridges. Small areas of Chelsea soils and Berrien soils were included in mapping.

Droughtiness is the major limitation, and wind erosion is a very severe hazard. Blowouts are common if a vegetative cover is not maintained. This soil can be used as woodland or as wildlife habitats, and it is commonly used for the production of Christmas trees. *Capability unit VIIs-1; woodland suitability group 17*

Plainfield fine sand, 6 to 12 percent slopes (PlC).—This soil is on sand ridges. Small areas of Chelsea soils were included in mapping.

Droughtiness is the major limitation, and wind erosion is a very severe hazard. Blowouts commonly occur if the soil is not protected by vegetation. This soil is commonly used as woodland or wildlife habitats, and it is commonly used for the production of Christmas trees. *Capability unit VIIs-1; woodland suitability group 17*

Plainfield fine sand, 12 to 25 percent slopes (PlE).—This inextensive soil is on sand ridges. Small areas of Chelsea soils were included in mapping.

Droughtiness is the major limitation, and wind erosion is a very severe hazard if the soil is left without vegetative cover. Most of the acreage is in permanent vegetation. *Capability unit VIIs-1; woodland suitability group 17*

Rensselaer Series

The Rensselaer series consists of deep, very poorly drained soils that formed in lakebed deposits of layered silt and fine sand. The native vegetation was prairie grass. These soils occur as large, nearly level areas and depressions in the southwestern part of the county. Representative profile—

0 to 12 inches, black heavy silt loam; friable.
12 to 30 inches, grayish-brown silty clay loam and sandy clay loam; yellowish-brown mottles; firm.
30 to 34 inches, light-gray very fine sand; brownish-yellow mottles; very friable.
34 to 60 inches +, gray and yellowish-brown, limy silt; many light-gray mottles; friable.

These soils are high in natural fertility, in content of organic matter, and in available moisture capacity. Permeability is moderately slow. The reaction of the surface layer and subsoil ranges from slightly acid to neutral.

These soils have a high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Rensselaer loam (0 to 2 percent slopes) (Re).—This soil has a profile similar to the one described for the series, except for the texture of the surface layer. A few, small, scattered areas of Darroch soils were included in mapping. *Capability unit IIw-1; woodland suitability group 11*

Rensselaer silt loam (0 to 2 percent slopes) (Rs).—This soil occurs in narrow, fingerlike depressions in close association with the Brookston soils. It generally is at a lower elevation than those soils. A few, small, scattered areas of Darroch soils and areas of loam were included in mapping.

A high water table is the major limitation. Runoff is slow; in some areas it is ponded. Both tile and surface drains are required to remove excess water. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-1; woodland suitability group 11*

Seward Series

The Seward series consists of deep, moderately well drained soils that formed in 20 to 42 inches of sand or loamy sand material underlain by heavy clay loam to silty clay material. The native vegetation was deciduous forest. These soils occur as gently sloping areas, mostly in the northwestern part of the county. Representative profile—

0 to 10 inches, dark grayish-brown loamy fine sand; very friable.
10 to 20 inches, light yellowish-brown fine sand; single grain.
20 to 30 inches, dark-brown fine sand; yellowish-brown and pale-brown mottles; loose.
30 to 42 inches, gray silty clay; strong-brown mottles in the upper part; very firm.
42 to 46 inches +, gray, limy silty clay; very firm.

The natural fertility is low, the content of organic matter is low, and the available moisture capacity is low to medium. Permeability is rapid in the sandy surface layer and slow in the underlying layers. The reaction of the surface layer ranges from very strongly acid to slightly acid.

These soils generally do not require tile drainage, but random tile lines at the base of sloping areas may be required to remove seepage water.

Most of the acreage is cultivated.

Seward loamy fine sand, 2 to 6 percent slopes (SeB).—This soil occurs mostly as small sandy knobs and gently sloping areas along the county line northwest of Medaryville. Little erosion has occurred. Small areas in which the slope is 1 percent and small, moderately eroded areas were included in mapping.

Erosion is the major hazard, but drought also is a hazard. This soil is suited to small grain and to meadow crops. If it is cultivated intensively, contouring and other erosion control measures are needed. *Capability unit IIIe-12; woodland suitability group 15*

Sloan Series

The Sloan series consists of deep, very poorly drained soils that formed in materials deposited by slow-flowing water. They are in depressions and oxbows on bottom land along Mill Creek and the Tippecanoe River. Representative profile—

0 to 8 inches, very dark gray, limy silt loam; friable.
8 to 30 inches +, very dark gray, limy silt loam; dark reddish-brown and yellowish-brown mottles; firm in upper part, friable in lower part; calcareous.

The natural fertility, the content of organic matter, and the available moisture capacity are high. The reaction ranges from slightly acid in some areas to mildly alkaline in others. Permeability is moderately rapid.

These soils have a high water table and need artificial drainage if crops are grown. Corn and soybeans are the principal crops. Areas that have not been drained are in permanent pasture or trees.

Sloan loam, calcareous variant (0 to 2 percent slopes) (So).—Most of this soil is in depressions and low areas on bottom land along the Tippecanoe River. In the depressions it adjoins the Eel soils. It has a profile similar to the one described for the series, except for the texture of the surface layer. Small areas of somewhat poorly drained soils and small areas of silt loam were included in mapping.

A high water table is the major limitation. In addition, this soil is flooded frequently, and water is ponded on the surface for short periods. Most of the acreage is woodland. Only a small acreage is cropland. Areas that have been drained can be cultivated intensively. *Capability unit IIIw-9; woodland suitability group 11*

Sloan silt loam, calcareous variant (0 to 2 percent slopes) (Ss).—Most of this soil is in depressions on bottom land along the Tippecanoe River. In the depressions it adjoins the Eel soils. Small areas of loam were included in mapping.

A high water table is the major limitation. In addition, the soil is flooded frequently and water is ponded on the surface for short periods. Most of the soil is woodland. Only a small acreage is cropland. Drained areas can be cultivated intensively. *Capability unit IIIw-9; woodland suitability group 11*

Stone Quarries

Stone Quarries (St) in the county are south of Francesville. They are limestone quarries used for the production of crushed stone and agricultural lime. *Capability unit VIIe-1; woodland suitability group 16*

Strole Series

The Strole series consists of deep, somewhat poorly drained soils, known locally as "black clay." These soils formed in lakebed deposits of limy silty clay and clay under prairie grass. They occur as small, nearly level areas in the southwestern part of the county. Representative profile—

0 to 9 inches, very dark brown silt loam; friable.
9 to 14 inches, dark-brown light silty clay loam; many yellowish-brown mottles; friable.
14 to 29 inches, yellowish-brown silty clay; many faint grayish-brown mottles; firm; calcareous in the lower part.
29 to 40 inches +, yellowish-brown, limy silty clay; many light brownish-gray mottles; very firm.

These soils are high in natural fertility, in content of organic matter, and in available moisture capacity. They are slowly permeable. The reaction of the surface layer and subsoil is predominantly neutral, although in some areas the reaction of the surface is slightly acid.

A seasonal high water table is the major limitation, but these soils are well suited to corn and other grain crops if drained and fertilized.

Strole silt loam (0 to 2 percent slopes) (Su).—This soil is upslope from the adjoining Montgomery soils. A few, small, scattered areas of Montgomery soils and small areas of Strole loam and silt loam that have a slope of 3 percent were included in mapping.

A high water table is the major limitation, and artificial drainage is necessary if crops are grown. Closely spaced tile is required for internal drainage, and surface drains are needed in many areas. Including a deep-rooted legume in the cropping system improves drainage and tilth. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-2; woodland suitability group 23*

Tawas Series

The Tawas series consists of deep, very poorly drained soils that formed in organic material derived from decomposed woody and sedgy plants. The organic layer is 12 to 42 inches thick and is underlain by sandy material. These soils occur throughout the county as nearly level areas and depressions that were once the sites of shallow ponds and bogs. Most areas are small, but those in Rich Grove Township are large. Representative profile—

0 to 21 inches, black and dark-brown muck; friable.
21 to 42 inches +, pale-brown and light-gray medium and fine sand; loose.

These soils are very high in content of organic matter and high in available moisture capacity. Permeability is moderately rapid in the organic material and rapid in the mineral soil. The reaction of the organic material ranges from medium acid to neutral.

Wetness is the major limitation, but these soils are well suited to corn if they are drained and fertilized. Sweet corn, mint, potatoes, and other special crops also grow well on them.

Tawas muck (0 to 2 percent slopes) (Ta).—This soil is in low depressions, generally adjoining the deeper Carlisle soils. A few, small, scattered areas of Carlisle soil and areas where the underlying material is fine sandy loam were included in mapping.

A high water table is the major limitation. Open ditches are required if crops are grown. Tile is suitable if used as part of a controlled drainage system. Controlling the drainage is important to avoid lowering the water table too much. Most of the acreage is cropland. Areas that are difficult to drain are used for permanent pasture. Wind erosion is a hazard if the surface layer lacks a protective vegetative cover. *Capability unit IVw-3; woodland suitability group 23*

Wallkill Series

The Wallkill series consists of deep, very poorly drained soils that formed in 10 to 40 inches of recent alluvium over muck or peat. The alluvial deposits have washed from the adjoining uplands and terraces. These soils occur commonly throughout the county as small, scattered, nearly level areas adjoining Carlisle and Tawas soils. Representative profile—

0 to 20 inches, very dark gray or black silt loam; friable.
20 to 45 inches, black muck; friable.
45 to 50 inches +, dark-brown peat; friable.

The natural fertility is high, the content of organic matter is medium, and the available moisture capacity is high. Permeability is moderate.

These soils are likely to be wet, but they are well suited to corn if they are drained and fertilized.

Wallkill silt loam (0 to 2 percent slopes) (Wa).—This soil is in depressions that range from 2 to 10 acres in size. It adjoins Carlisle soils and Tawas soils and generally is farmed with them. A few, small, scattered areas of fine sandy loam, loamy fine sand, and loam were included in mapping.

A high water table is the major limitation; some areas are difficult to drain because suitable outlets are lacking. Diversions are generally needed to intercept runoff from uplands. Most of this soil is cropland. *Capability unit IIw-7; woodland suitability group 23*

Washtenaw Series

The Washtenaw series consists of deep, very poorly drained soils that formed in 10 to 40 inches of recent alluvium deposited over dark-colored mineral soils. The lighter colored alluvial deposits have washed from the adjacent uplands and terraces. These soils commonly occur as small, nearly level areas adjoining Brookston soils in the eastern and southeastern parts of the county. Representative profile—

0 to 22 inches, dark grayish-brown and dark-gray silt loam; friable.
22 to 44 inches, black silty clay to silty clay loam; firm.
44 to 65 inches, light olive-gray and light olive-brown light silty clay loam and light clay loam; many yellowish-brown mottles; slightly firm.
65 to 70 inches +, light olive-brown loam till; many light brownish-gray mottles; friable; calcareous.

The natural fertility is high, the content of organic matter is medium, and the available moisture capacity is high. Permeability is slow.

These soils are wet, but they are well suited to corn and other grain crops if drained and fertilized.

Washtenaw silt loam (0 to 2 percent slopes) (Wh).—This soil occurs in potholes and in depressional areas 2 to 5 acres in size. It adjoins Brookston soils and generally is farmed with them. A few, small, scattered areas of loam were included in mapping.

A high water table is the major limitation, and some of the potholes are difficult to drain because of inadequate outlets. Diversions are generally needed to intercept runoff from uplands. Most of the acreage is cropland. *Capability unit IIw-1; woodland suitability group 11*

Westland Series

The Westland series consists of moderately deep, very poorly drained soils that formed in 24 to 42 inches of loam outwash over limy sand and gravel. The native vegetation was marsh grass. These soils occur as nearly level areas and depressions in the southeastern part of the county. Representative profile—

0 to 12 inches, black heavy silt loam; friable.
12 to 26 inches, very dark gray and olive-gray silty clay loam and sandy clay loam; firm.
26 to 32 inches, dark grayish-brown gravelly sandy clay loam; firm.
32 to 45 inches +, light-gray sand and gravel; loose.

The natural fertility, the content of organic matter, and the available moisture capacity are high. Permeability is moderately slow in the upper part and rapid in the lower part. The reaction of the surface layer and subsoil is slightly acid to neutral.

These soils have a high water table, but they are well suited to corn and other grain crops if drained and fertilized.

Westland loam, moderately deep (0 to 2 percent slopes) (Ws).—Except for the texture of the surface layer, this soil has a profile similar to the profile described for the series. Small areas of silt loam were included in mapping. *Capability unit IIw-4; woodland suitability group 11*

Westland silt loam, moderately deep (0 to 2 percent slopes) (Wt).—This soil occurs in narrow glacial channels and broad depressions. It adjoins Brookston and Gilford soils, which are upslope. A few, small, scattered areas of Brookston and Gilford soils were included in mapping.

A high water table is the major limitation. Runoff is very slow and is ponded in small areas. Open ditches and tile are required. Controlling the drainage is important in order to avoid lowering the water table too much. Most of the acreage is cropland. If drained, it can be cultivated intensively. *Capability unit IIw-4; woodland suitability group 11*

Use and Management of Soils

This section contains information about the use and management of soils for crops and pasture, woodland, wildlife, and engineering.

Crops and Pasture

In this section the soils of the county are grouped according to their suitability for crops and pasture. The capability grouping is explained and outlined. Management by capability units is briefly discussed, and each capability unit is described. Predicted yields are given for the principal crops grown on each soil under two levels of management.

Capability grouping of soils

The capability classification is a grouping of soils that shows, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to the degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels—the capability class, the subclass, and the unit.

CAPABILITY CLASSES, the broadest grouping, 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 that have few limitations that restrict their use.

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

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

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

Class V. Soils that are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife food and cover. There is no class V soil in the county.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture or range, woodland, or wildlife food and cover. There is no class VI soil in the county.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. There is no class VIII soil in the 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 only some parts of the United States, 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 subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit 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 capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The soils of Pulaski County have been placed in 26 capability units, each of which is discussed in the following pages. All of the soils in one unit need about the same kind of management, respond to management in about the same way, and have essentially the same limitations. In each unit, the characteristics and suitability of the soils for crops are discussed and some suggestions are given for management. The cropping systems mentioned are given as examples. They are not the only cropping systems suited to the soils in the group.

Representatives of the Soil Conservation Service can help farmers select cropping systems that will maintain their soils. The cropping system to be used depends upon the practices used in conjunction with it.

The suggested management for the sloping soils in these units is based upon the assumption that the average length of slope is 100 feet. Although the reaction, the natural fertility, and the levels of nitrogen, phosphorus, and potassium are given for the soils as a group in each capability unit, lime and fertilizer should be applied according to needs indicated by soil tests.

The names of soil series represented are mentioned in the description of each capability unit, but all of the soils of a series may not be in the same capability unit. To find the names of all the soils in a capability unit, refer to the Guide to Mapping Units.

CAPABILITY UNIT I-1

This unit consists of deep, moderately dark colored and dark colored soils of the Celina, Corwin, Foresman, and Miami series. These soils are well drained and moderately well drained. They occur as level and nearly level areas on uplands and terraces.

The surface layer is medium textured, the subsoil is moderately fine textured, and the underlying material is medium or fine textured. The available moisture capacity is high, and permeability is moderately slow. Runoff is slow. The content of organic matter is medium in the Celina and Miami soils and high in the Corwin and Foresman soils. Natural fertility is medium, but the level of nitrogen is low or medium. The reaction generally is acid.

These soils are well suited to corn, soybeans, and small grain. They are also suited to meadow mixtures of alfalfa and bromegrass or of red clover and orchardgrass. If well managed, they can be used continuously for row crops. Crop residue and cover crops help to maintain tilth and improve fertility. Keeping tillage to a minimum is important.

These soils do not need tile, but tile lines from adjoining soils can be extended through these soils. These soils are suitable for irrigation, but irrigation of any except high-value crops is not likely to be economically justifiable.

CAPABILITY UNIT I-2

Abscota fine sandy loam is the only soil in this capability unit. It is a deep, dark-colored, well-drained soil in small, narrow, nearly level areas on flood plains and islands.

The surface layer and subsurface layer are moderately coarse textured, and the underlying material is coarse textured. Available moisture capacity is medium, and permeability is rapid. The content of organic matter is high. Natural fertility and the content of nitrogen are medium. The reaction is slightly acid or neutral.

Only the more extensive areas are used for crops. Areas dissected by streams are used mostly as woodland.

This soil is well suited to crops commonly grown in the county. Corn and soybeans are the main crops. Alfalfa and small grain may be damaged during prolonged floods. A cover crop of rye or ryegrass, sown during the last cultivation of the row crop, supplies organic matter. Keeping tillage to a minimum is important.

Tile is not needed, but the tile lines from adjoining soils can be extended through this soil. Overflow channels and scoured streambanks need sod cover for control of erosion. Diversions may be needed to prevent damage caused by runoff from adjoining uplands.

This soil is suitable for irrigation, but irrigation of any but high-value crops is not likely to be economically justifiable.

CAPABILITY UNIT IIe-2

This unit consists of soils of the Celina, Corwin, and Parr series. These are deep, dark-colored, well-drained, gently sloping soils on uplands. They are moderately eroded, and the risk of further erosion is moderate.

The surface layer is medium textured, the subsoil is moderately fine textured, and the underlying material is medium textured. Available moisture capacity is high, and permeability is moderate or moderately slow. The content of organic matter is high. Natural fertility is medium. The nitrogen content is medium, and the content of phosphorus is generally lower than that of potassium. The reaction is slightly acid or medium acid.

These soils are well suited to corn, soybeans, and small grain. They are also suited to meadow consisting of alfalfa and bromegrass or of red clover and orchardgrass or timothy. For permanent pasture a mixture of birdsfoot trefoil with either orchardgrass or timothy is suitable.

The Corwin and Parr soils are suited to a cropping system consisting of 2 years of row crops, 1 year of small grain, and 1 year of meadow. The Celina soil is more likely to erode than the other soils and should be used less intensively.

Keeping sod in waterways, using crop residue, and growing cover crops help in controlling erosion and maintaining tilth and fertility. Keeping tillage to a minimum is important.

CAPABILITY UNIT IIe-5

This unit consists of deep, moderately dark colored soils of the Celina and Miami series. These soils are well drained and moderately well drained. They occur as gently sloping areas on uplands, and in most places are moderately eroded. The risk of further erosion is moderate.

The surface layer is moderately coarse textured, the subsoil is moderately fine textured, and the underlying material is medium textured. Available moisture capacity is medium, and permeability is moderately slow. The content of organic matter is low. Natural fertility is low to medium. The content of phosphorus is low, and that of potassium is medium. The reaction is strongly acid to neutral.

These soils are suited to corn and soybeans, to small grain, and to grass-legume mixtures. Alfalfa and bromegrass or red clover and orchardgrass or timothy are suitable mixtures for meadow. Birdsfoot trefoil and orchardgrass or timothy are suitable mixtures for permanent pasture.

A satisfactory cropping system consists of 2 or 3 years of row crops, followed by a year of small grain and a year of meadow.

Contouring, keeping waterways sodded, using crop residue, and planting cover crops help to control erosion and improve fertility. Keeping tillage to a minimum is also important.

These soils can be irrigated, but irrigation may not be economically justifiable, except for crops of high value.

CAPABILITY UNIT IIs-2

Foresman fine sandy loam, sandy variant, is the only soil in this capability unit. It is a deep, dark-colored, moderately well drained soil in nearly level areas on the outwash plain. Droughtiness is a moderate limitation.

This soil has a moderately coarse textured surface layer and a moderately coarse to moderately fine textured subsoil underlain by coarse-textured material. Available moisture capacity is medium, permeability is moderately slow, and runoff is slow. The content of organic matter is high. Natural fertility is medium, and the content of nitrogen is medium. The reaction generally is acid.

This soil is suited to grain, to grass-legume mixtures, and to corn and soybeans. Mixtures of alfalfa and bromegrass or red clover and orchardgrass are suitable for meadow. Birdsfoot trefoil mixed with orchardgrass makes a suitable permanent pasture. Because of the droughtiness, meadow crops and small grain should be included in the cropping system.

Using crop residue and growing cover crops help to improve fertility, maintain organic matter, and control wind erosion, which is a moderate hazard during spring. Keeping tillage to a minimum is important.

Tile is not needed, but tile lines from adjoining soils can be extended through this soil. Irrigation is possible but may not be economically justifiable, except for crops of high value.

CAPABILITY UNIT IIs-3

This unit consists of deep, moderately dark and dark colored soils of the Ayr, Celina, and Miami series. These soils are well drained and occur as nearly level areas on uplands. They are moderately limited by droughtiness.

The surface layer is moderately coarse textured, and the subsoil is moderately fine textured. It is underlain by medium-textured material. Available moisture capacity is medium, permeability is moderately slow, and runoff is slow. The content of organic matter is medium in the Celina and Miami soils and high in the Ayr soils. Natural fertility is medium, but the nitrogen content is low to medium. The reaction is generally acid.

These soils are well suited to grain and to grass-legume mixtures. They are also suited to corn and soybeans. If used for meadow, they are suited to a mixture of alfalfa and bromegrass or of red clover and orchardgrass. A mixture of birdsfoot trefoil and orchardgrass or timothy makes a good permanent pasture.

A satisfactory cropping system consists of 2 years of row crops, 1 year of small grain, and 1 year of meadow.

Using crop residue and growing cover crops improve fertility and help to control wind erosion, which is a moderate hazard in spring. Keeping tillage to a minimum is important.

Tile is not needed, but tile lines from adjoining soils can be extended through these soils. These soils can be irrigated, but irrigation may be practical only for crops of high value.

CAPABILITY UNIT IIw-1

This unit consists of deep, dark-colored, very poorly drained soils of the Brookston, Mermill, Rensselaer, and Washtenaw series. These soils occur as nearly level depressions along drainageways. They are moderately limited by wetness.

The surface layer is medium textured, the subsoil is moderately fine textured, and the underlying material is medium textured. Runoff and permeability are moderately slow, and available moisture capacity is high. The content of organic matter is high. Natural fertility generally is high.

If adequately drained and fertilized, these soils are well suited to corn, soybeans, and other row crops and to most small grains. Because of wetness, the selection of legumes and grasses is somewhat limited. Ladino clover, alsike clover, and orchardgrass grow well.

These soils can be row cropped continuously. Including a deep-rooted legume in the cropping system helps to promote movement of water and air through the moderately fine textured subsoil. Using crop residue helps to maintain tilth. Keeping tillage to a minimum is important.

Installation of an adequate drainage system is essential, and a complete tile system is required in most areas. Open ditches or large main tile lines are needed as outlets for the tile system. Random tile lines or shallow surface drains are needed to drain potholes or ponded areas (fig. 4).

CAPABILITY UNIT IIw-2

This unit consists of deep, dark and moderately dark colored soils of the Blount, Conover, Crosby, Darroch, Odell, and Strole series. These soils are in nearly level areas on uplands and outwash plains, and they are somewhat poorly drained. They are moderately limited by wetness.

The surface layer is medium textured, and the subsoil is moderately fine textured. The texture of the underlying material is medium to fine. Runoff is slow, permeability is moderately slow or slow, and available moisture capacity is high. Natural fertility generally is high, although the nitrogen level is low in the moderately dark colored soils and medium in the dark-colored soils.

If adequately drained and fertilized, these soils are well suited to corn, small grain, and most legumes and grasses. A suitable meadow mixture consists of alfalfa and bromegrass or timothy, or of red clover, Ladino clover, and orchardgrass. For permanent pasture, a mixture of birdsfoot trefoil and orchardgrass is suitable.

These soils are suitable for continuous row cropping or for 2 years of row crops followed by 1 year of small grain and an intercrop. A deep-rooted legume in the cropping system promotes movement of water and air through the moderately fine textured subsoil.

Using crop residue helps to maintain tilth and to control wind erosion, which is a moderate hazard during spring. Keeping tillage to a minimum is important.

Installation of a drainage system is essential, and a complete tile system is required in most level areas. Only random tile may be needed in areas that have a slope of 2 to 6 percent. Open ditches or large main tile lines are needed as outlets for the tile system. Grass waterways are needed to remove surface water from many areas. Diversions also may be needed to control runoff from adjoining higher areas. The Strole soil requires a complete surface drainage system supplemented by tile.

CAPABILITY UNIT IIw-4

This unit consists of deep, dark-colored, very poorly drained soils of the Gilford and Westland series. They are in nearly level depressions and low areas along drainageways and are moderately limited by wetness.

These soils have a medium-textured surface layer and a moderately fine textured or medium-textured subsoil underlain by sand and gravel. Runoff is slow. Permeability is moderately slow to moderately rapid. Available moisture capacity is high. The content of organic matter is high.

***Figure 4.*—A completed surface drain and outlet in a soil in capability unit IIw-1.**

Natural fertility generally is high, although the level of available potassium is low. Many areas of the Gilford soils are deficient in manganese for such crops as soybeans, wheat, and oats. This deficiency commonly occurs when the pH is raised above 6.2. As only a small amount of manganese is required for each crop, it can be supplied by an application of a foliar spray.

These soils are well suited to corn, soybeans, and other row crops and to most small grains. Because of the wetness, the selection of legumes and grasses is somewhat limited. Ladino clover, alsike clover, and orchardgrass generally grow well. Although these soils can be row cropped continuously, including a deep-rooted legume in the rotation for the Westland soils is a way of promoting the movement of water and air through the moderately fine textured subsoil.

Using crop residue helps to maintain tilth and to control wind erosion, which is a moderate hazard during spring.

These soils have a high water table, and open ditches are needed to control it. In some areas tile is needed to supplement the open ditches. If tile is laid in the sandy material, care should be taken to prevent sand from seeping into the tile lines. Shallow surface drains are needed to remove ponded water from many areas of the Westland soils.

CAPABILITY UNIT IIw-7

This unit consists of deep, moderately dark colored soils of the Eel and Wallkill series. The Eel soil is moderately well drained. It occurs primarily on the flood plain of the Tippecanoe River and is subject to flooding. The Wallkill soil is very poorly drained and is moderately limited by a high water table. It occurs as small areas adjoining Carlisle and Tawas soils throughout the county.

These soils consist of medium-textured alluvial material. The Wallkill soil is underlain by peat or muck at a depth of 10 to 40 inches. The available moisture capacity of soils in this unit is high, and permeability is moderate. The content of organic matter is medium. Natural fertility is high, and reaction ranges from slightly acid to mildly alkaline.

If drained and fertilized, these soils are well suited to corn, soybeans, and other row crops, and they can be row cropped continuously. Making use of crop residue helps to maintain organic matter and good tilth. Because they are flooded, the Eel soils are not suited to small grain or meadow.

An adequate drainage system is necessary for the Wallkill soil if crops are grown. Tile generally is effective, but open ditches may be required if an outlet for tile is not available. The Eel soil generally does not require tile drainage, but tile lines from adjoining soils can be extended through it. In many areas diversions are needed to intercept runoff from adjoining uplands.

CAPABILITY UNIT IIIe-5

Miami fine sandy loam, 6 to 12 percent slopes, moderately eroded, is the only soil in this capability unit. It is a deep, moderately dark colored soil on sloping uplands. The hazard of further erosion is severe.

The surface layer is moderately coarse textured, the subsoil is moderately fine textured, and the underlying material is medium textured. The available moisture capacity is medium, and permeability is moderately slow. The content of organic matter is medium to low. Natural fertility is medium to low. The level of potassium is medium, and that of phosphorus is low. There is a moderate need for lime.

Because of the erosion hazard, this soil is better suited to meadow and pasture than to grain. Suitable mixtures for meadow consist of alfalfa and bromegrass or of red clover and orchardgrass or timothy. A mixture of birdsfoot trefoil and orchardgrass or timothy makes good permanent pasture.

A suitable cropping system, even if the soil is well managed, consists of no more than 2 years of row crops, 1 year of small grain, and 1 year of meadow.

Contouring, keeping waterways sodded, using crop residue, and growing cover crops are necessary to control further erosion and to improve fertility. Keeping tillage to a minimum is also important. The short, irregular slopes generally are not adaptable to stripcropping. Because of the limited productivity and the degree of slope, the soil generally is not suited to irrigation.

CAPABILITY UNIT IIIe-12

This unit consists of deep and moderately deep, light-colored and moderately dark colored soils of the Metea, Oshtemo, and Seward series. These soils are well drained and moderately well drained. They occur as gently sloping and sloping areas on outwash terraces and uplands. They are severely limited by wind erosion, which is the major hazard, and by droughtiness.

The surface layer is coarse or moderately coarse textured. The texture of the subsoil is moderately coarse or moderately fine, and that of the underlying material is coarse, medium, or fine. The available moisture capacity ranges from low to medium, and permeability from moderately rapid to slow. The content of organic matter is low to medium. Natural fertility is medium to low, nitrogen and phosphorus are low, and potassium is medium to low. The reaction is medium acid to strongly acid.

Grass-legume mixtures and grain crops, including wheat, can be grown on these soils. A mixture of alfalfa and bromegrass or of red clover and orchardgrass or timothy is suitable for meadow. For permanent pasture, birdsfoot trefoil with orchardgrass or timothy is suitable.

A suitable cropping system under a medium level of management consists of a row crop for 1 year, small grain 1 year, and meadow 1 year. Under a high level of management, the cropping system can consist of row crops for 2 years, small grain 1 year, and meadow 1 year. Using crop residue and including cover crops in the system help to control erosion, increase water-holding capacity, and improve fertility.

CAPABILITY UNIT IIIs-1

This unit consists of deep and moderately deep, light-colored soils of the Bronson, Chelsea, Fox, Metea, and Oshtemo series. These soils occur as nearly level areas on outwash terraces and uplands. They are moderately well drained and well drained. Droughtiness is the major limitation, and the hazard of wind erosion is moderate.

The texture of the surface layer is moderately coarse or coarse, and that of the subsoil is moderately fine or moderately coarse. The underlying material is coarse-textured sand and gravel, except in the Metea soil, which is underlain by medium-textured material. The available moisture capacity is medium, and permeability is moderately slow to rapid. The content of organic matter is low. Natural fertility and nitrogen are low, because the sandy texture contributes to the leaching of nutrients. Therefore, fertilizer should be applied yearly. The reaction generally is strongly acid.

Meadow crops and small grain grow well on these soils. A mixture of alfalfa and bromegrass or orchardgrass is suitable for meadow. Row crops can be grown, but yields are low to medium because of the droughtiness.

Under a medium level of management, these soils are suited to a cropping system that consists of a row crop for 1 year, small grain 1 year, and meadow 1 year. Under a high level of management, row crops can be grown more frequently.

Using crop residue and planting cover crops increase the organic matter, improve fertility, and help to control wind erosion. Drainage is not necessary, but tile lines from adjoining soils can be extended through these soils. Irrigation is suitable, but it may not be economically justifiable, except for special crops.

CAPABILITY UNIT IIIw-1

This unit consists of deep, dark-colored, very poorly drained soils of the Gilford and Maumee series. These soils occur as nearly level areas in broad depressions of the outwash plain. A high water table is the major limitation. Wind erosion, however, is a moderate hazard during spring.

The surface layer is moderately coarse in texture, and the subsoil is moderately coarse or coarse. The underlying material consists of coarse-textured sand and some gravel. The Gilford soil has medium available moisture capacity and moderately rapid permeability. The Maumee soils have low available moisture capacity, and rapid permeability. Runoff is slow. The content of organic matter is high. Natural fertility is medium, and reaction ranges from medium acid to neutral. The sandy texture contributes to the leaching of nutrients from these soils. Consequently, they are frequently deficient in manganese for soybeans, wheat, oats, and similar crops. This deficiency commonly occurs when the pH is above 6.2. Since only a small amount of manganese is required for each crop, the deficiency can be corrected by an application of a foliar spray.

If drained and fertilized, these soils are well suited to corn, soybeans, and other row crops. They are also well suited to small grain. The selection of legumes and grasses depends largely on the extent to which the soils are drained. Red clover, Ladino clover, orchardgrass, and tall fescue generally grow well.

Under a high level of management, these soils can be row cropped continuously. Using crop residue helps to maintain tilth and control wind erosion. Keeping tillage to a minimum is important.

A drainage system is essential; yet, if overdrained, these soils become droughty. Open ditches are needed to control the water table, and low-cost control dams can be installed in the ditches to avoid overdrainage. Tile also may be needed (fig. 5).

CAPABILITY UNIT IIIw-2

Montgomery silty clay is the only soil in this capability unit. It is a deep, dark-colored, very poorly drained soil in low areas on the glacial lakebed northeast of Francesville. Wetness is the major limitation of this fine-textured soil.

***Figure 5.*—Installing tile in Maumee fine sandy loam, a class IIIw soil. A sheet of fiberglass is placed on top of the tile and underneath it to prevent sand and silt from seeping into the tile lines.**

The available moisture capacity is medium, and permeability is slow. The content of organic matter is high. Natural fertility was high before cultivation; now the level of phosphorus and potassium is medium. The reaction is neutral to slightly acid.

If drained and fertilized, this soil is well suited to row crops, small grain, and meadow. Alfalfa, Ladino clover, or alsike clover can be grown with bromegrass or orchardgrass if drainage is sufficient. Including a deep-rooted legume in the cropping system promotes the movement of water and air through the fine-textured layers.

A suitable cropping system under a high level of management consists of row crops for not more than 3 years, small grain 1 year, and meadow 1 year. Using crop residue and growing a cover crop help to maintain good tilth. Keeping tillage to a minimum is important.

Surface drainage, supplemented in some places by random tile lines or by a complete tile system, is needed for this soil (fig. 6). A special filter material should be packed around the tile to prevent it from sealing and to allow the water to enter the tile lines.

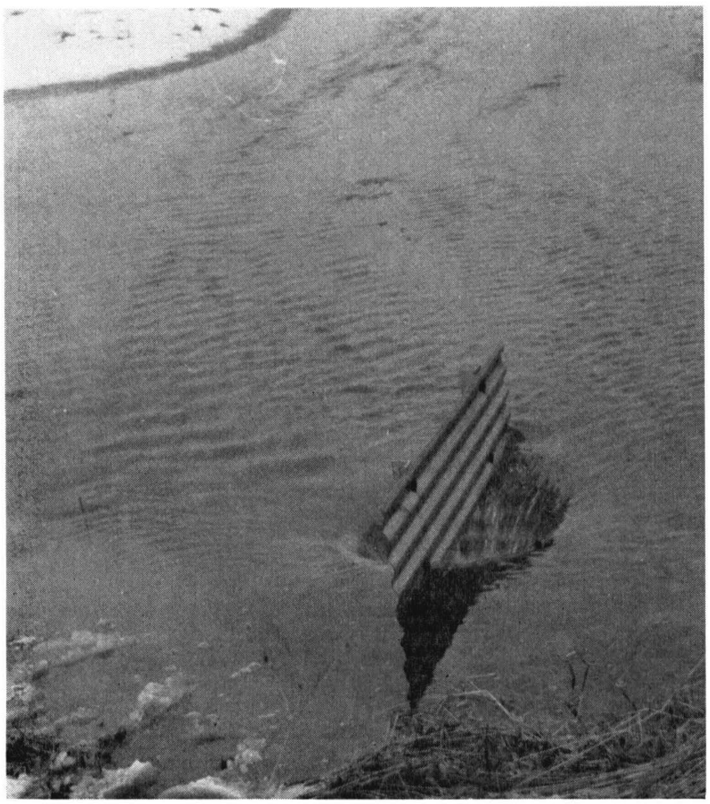

Figure 6.—A surface drain in action in Montgomery silty clay during the late winter months. Runoff flows through the drop inlet structure. Note the antiswirl device on the drop inlet. This is a class IIIw soil.

CAPABILITY UNIT IIIw-3

This unit consists of deep, moderately dark colored, somewhat poorly drained soils of the Aubbeenaubbee and Crosby series. These soils occur as nearly level areas on uplands. They are limited by wetness.

The surface layer is moderately coarse textured, the subsoil is moderately fine textured, and the underlying material is medium textured. The available moisture capacity is medium, and permeability is moderately slow. The content of organic matter is medium. Natural fertility is medium to low, and nitrogen is low to medium. The reaction is generally medium acid to strongly acid.

If drained and fertilized, these soils are suited to row crops, small grain, pasture, and meadow. A meadow mixture of alfalfa and bromegrass or orchardgrass can be grown if the soil is drained and otherwise well managed. If the drainage is inadequate, Ladino clover and alsike clover should be substituted for alfalfa. Under a medium level of management, a mixture of red clover and orchardgrass or timothy is suitable. For permanent pasture, birdsfoot trefoil with orchardgrass or timothy is suitable.

A suitable cropping system under a high level of management consists of 3 years of row crops, a year of small grain, and an intercrop. Using crop residue and growing cover crops help maintain fertility and control wind erosion. Keeping tillage to a minimum also is important.

A complete tile drainage system is needed on the level areas. Some of the gently sloping areas need only random tile lines, and some need grass waterways.

CAPABILITY UNIT IIIw-4

This unit consists of soils of the Brady, Homer, and Hoopeston series. These are deep, moderately dark and dark colored soils on outwash terraces. They are nearly level and somewhat poorly drained and, consequently, are limited by wetness.

The surface layer is coarse textured or moderately coarse textured, the subsoil is moderately fine textured or moderately coarse textured, and the underlying material is coarse textured. The available moisture capacity is medium, and permeability is moderately slow to moderately rapid. The content of organic matter is medium to high. Natural fertility is medium to low, and the reaction ranges from medium acid to strongly acid.

If drained and fertilized, these soils are suited to all grain and grass-legume crops grown in the area. Alfalfa and bromegrass or orchardgrass is a suitable meadow mixture if the soils are drained and otherwise well managed. Ladino clover or alsike clover can be substituted for alfalfa if drainage is inadequate. Red clover and orchardgrass or timothy is a suitable meadow mixture for a medium level of management. A good mixture for permanent pasture consists of birdsfoot trefoil and orchardgrass or timothy.

A suitable cropping system under a high level of management consists of 3 years of row crops and 1 year of small grain with an intercrop.

Using crop residue and growing cover crops help to maintain fertility and control wind erosion, which is a hazard during winter and spring (fig. 7). Keeping tillage to a minimum is important.

The installation of an adequate drainage system is essential in the management of these soils. Open ditches work satisfactorily, but tile may be needed to supplement them. If tile is installed, special construction methods must be used to prevent sand from entering and clogging the tile.

CAPABILITY UNIT IIIw-8

Carlisle muck is the only soil in this capability unit. It is a deep, dark-colored, very poorly drained soil in

Figure 7.—Left: **Active wind erosion on Brady fine sandy loam, a class IIIw soil; blowing sand can completely shred young soybean and corn plants in a short time.** ***Right:*** **Good management of crop residue on class IIIw soil; disking cornstalks into the soil immediately after harvest helps to control wind erosion.**

nearly level areas in depressions throughout the county. This soil is limited by wetness.

The muck is commonly 30 inches thick and grades to fibrous and woody peat, which extends to a depth of 42 inches or more. Runoff is slow, available moisture capacity is high, and permeability is moderately rapid. The content of organic matter is very high. Natural fertility generally is high, but the level of potassium is low and the level of phosphorus frequently becomes low after a few years of cropping. The nitrogen level generally is high, but this soil warms up slowly in spring, and adequate nitrogen for plant growth may not always be available during this period. Applications of nitrogen as a side dressing are generally profitable for corn production.

If drained, this soil is well suited to corn and other row crops and can be row cropped continuously. Areas that are not adequately drained for crops are commonly used for permanent pasture. Tall fescue and reed canarygrass are suitable grasses. Mint can be grown on the better drained areas.

Using crop residue and growing cover crops are helpful in maintaining the high level of organic matter and in controlling wind erosion, which is a moderate hazard during spring. Keeping tillage to a minimum is important.

An adequate drainage system is essential in the management of this soil. Open ditches, generally supplemented by tile, are needed to control the high water table. Low-cost control dams can be constructed in the open ditches. Pumping may be required if a gravity outlet is not available. In many areas diversions are needed to intercept runoff from adjoining uplands.

CAPABILITY UNIT IIIw-9

This unit consists of deep, dark-colored, very poorly drained soils of the Sloan series. These are alluvial soils in depressions on the flood plain of the Tippecanoe River. Wetness is the major limitation, and frequent flooding is a hazard.

The soil layers are medium textured. The available moisture capacity is high, and permeability is moderately rapid. The content of organic matter is high. Natural fertility is high, and the reaction ranges from slightly acid to mildly alkaline.

If drained and fertilized, these soils are well suited to corn, soybeans, and other row crops. They can be row cropped continuously. Because they are frequently flooded during winter and spring, they are not suited to small grain or meadow crops.

Crop residue and cover crops help to maintain tilth and control water erosion.

An adequate drainage system is essential if crops are grown, and tile is effective, but outlets are lacking in many areas. In many areas surface drainage also is needed to remove ponded water. At the base of slopes open ditches may be needed to drain off seepage water.

CAPABILITY UNIT IVe–5

Miami soils, 6 to 12 percent slopes, severely eroded, are the only soils in this capability unit. They are deep, light-colored, well-drained soils on sloping uplands. The hazard of further erosion is severe.

The texture of the surface layer ranges from moderately coarse to moderately fine. The texture of the subsoil is moderately fine, and that of the underlying material is medium. The available moisture capacity is medium, permeability is moderately slow, and the content of organic matter is low. Natural fertility is low. Phosphorus generally is low, potassium is medium, and nitrogen is low. The reaction generally is medium acid.

These soils are suited to grass-legume meadow and small-grain crops. They are not well suited to row crops, although one can be grown occasionally. A mixture of alfalfa and bromegrass or of red clover and orchardgrass is suitable for meadow. Birdsfoot trefoil and orchardgrass or timothy is suitable for permanent pasture.

Contouring and keeping waterways sodded are necessary to control further erosion. Using crop residue and growing cover crops improve soil fertility, and these practices also control erosion. Keeping tillage to a minimum is important.

CAPABILITY UNIT IVs–1

This unit consists of deep, light-colored and dark-colored soils of the Ade, Bronson, Berrien, and Plainfield series. These are nearly level to sloping soils on outwash terraces and sand ridges. They are moderately well drained and well drained and are droughty.

These soils are predominantly coarse textured throughout. The available moisture capacity is low, and permeability is moderately rapid or rapid. The content of organic matter is low except in the Ade soil; it is medium in that soil. Natural fertility is low, nitrogen is low, and the reaction generally is strongly acid. The sandy texture contributes to the leaching of nutrients from the soils. Therefore, fertilizer should be applied yearly.

Meadow and small grain crops grow well on these soils. Alfalfa with bromegrass or orchardgrass is a good mixture for meadow. Row crops are not suited because of the droughtiness. An early maturing row crop can be grown occasionally. Using crop residue and growing cover crops are ways to increase organic matter and to improve fertility. These practices also help to control wind erosion, which is a moderate hazard.

The nearly level areas of these soils can be irrigated, but irrigation may be economically justifiable only for special crops. Drainage is not required, but tile lines from adjoining soils can be extended through these soils.

CAPABILITY UNIT IVw–1

The one soil in this capability unit is Newton loamy fine sand. It is a deep, dark-colored, very poorly drained soil in nearly level depressions on outwash plains. A high water table and strong acidity are the major limitations.

This soil is coarse textured throughout. It has low available moisture capacity and rapid permeability. The content of organic matter is high. Natural fertility is low, and the reaction is strongly acid or very strongly acid.

If adequately drained and fertilized, this soil is suited to corn, soybeans, and other row crops. It is well suited to small grain. The selection of suitable legumes and grasses depends largely on the extent of drainage. Red clover, Ladino clover, orchardgrass, and tall fescue generally grow well if the acidity is corrected.

A suitable cropping system consists of 3 years of row crops, 1 year of small grain, and an intercrop. Using crop residue is helpful in conserving moisture and in controlling wind erosion, which is a moderate hazard during spring. Keeping tillage to a minimum is important.

An adequate drainage system is essential; yet, if overdrained, this soil becomes droughty. Open ditches are needed to control the water table, and tile also may be needed. Precaution should be taken to prevent sand from seeping into the tile lines.

CAPABILITY UNIT IVw–2

Morocco loamy fine sand is the only soil in this capability unit. This soil is deep, moderately dark colored, and somewhat poorly drained. It occurs as slightly elevated, nearly level depressions in the outwash plain. Excess water and strong acidity are the major limitations.

This soil is coarse textured throughout. It has low available moisture capacity and rapid permeability. It is low in content of organic matter. The natural fertility is low, for the sandy texture contributes to the leaching of nutrients. The reaction is strongly acid to very strongly acid.

The low available moisture capacity limits the number of crops for which this soil is suitable. If fertilized, this soil is well suited to most kinds of small grain. The selection of suitable legumes and grasses depends largely on the extent to which the soil is drained. The better drained areas, if heavily fertilized, are suited to alfalfa, red clover, and bromegrass. Corn, soybeans, or some other row crop can be grown occasionally, but these are likely to grow only fairly well, except during years of exceptional rainfall.

Using crop residue helps to conserve moisture and control wind erosion, a moderate hazard during spring. Keeping tillage to a minimum is important.

Open ditches, supplemented in some areas by tile, are necessary to lower the water table, which is high in spring. Overdrainage should be avoided, however, because the soil may become droughty. Structures for controlling the water table are satisfactory in some areas. Precautions should be taken to prevent sand from seeping into the tile lines.

CAPABILITY UNIT IVw–3

This unit consists of dark-colored, very poorly drained muck soils of the Edwards and Tawas series. These soils occur as nearly level areas in depressions throughout the county. They are limited by wetness.

The muck is commonly 24 to 30 inches thick, but it ranges from 12 to 42 inches in thickness. The Tawas soil is underlain by sand, and the Edwards soil by marl. The available moisture capacity of the Edwards soil is high; that of the Tawas soil is medium. Runoff is slow.

230-283—67——3

Permeability is moderately rapid in the muck, variable in the marl, and rapid in the sand. The content of organic matter is very high.

Natural fertility generally is high, although the level of potassium is low. The level of nitrogen is high, but nitrogen is not always available for plant growth because these soils warm up slowly in spring. Applications of nitrogen as a side dressing generally are profitable for corn production.

If they are drained, these soils can be row cropped continuously. Areas that are not adequately drained for field crops are used for permanent pasture. Tall fescue and reed canarygrass are suitable pasture plants. Mint can be grown on the better drained areas.

Using crop residue and growing cover crops help to maintain the content of organic matter and to control wind erosion, which is a moderate hazard in spring. Keeping tillage to a minimum is important.

The water table is high in these soils, and open ditches are needed to control it. Pumping may be required if a gravity outlet is not available. Low-cost control dams are satisfactory in the Tawas soils. Diversions are needed in many areas to intercept runoff from adjoining uplands.

CAPABILITY UNIT VIIe-1

This unit consists of three miscellaneous land types—clay pits, sand and gravel pits, and limestone quarries.

Clay pits are areas in which the surface layer and subsoil have been stripped from the soil and used for the production of tile and other purposes. Two such pits are located north of Francesville. The sand and gravel pits are mostly along the Tippecanoe River and Mill Creek and their tributaries. A few sand pits are in the Chelsea and Plainfield sand ridges in the northern part of the county. These pits are used primarily as a source of road fill. The limestone quarries are south of Francesville. They are used for the production of crushed stone and agricultural lime.

Areas around the clay pits and sand and gravel pits are suitable as wildlife habitats. They can be improved by plantings that provide wildlife food and cover.

CAPABILITY UNIT VIIs-1

This unit consists of deep, light-colored, well-drained soils of the Chelsea and Plainfield series. These soils are gently sloping to steep. They are mainly on the sand ridges of the outwash plain. Their major limitation is droughtiness.

These soils are coarse textured. Their available moisture capacity is low, and they are rapidly permeable. The content of organic matter is low. Natural fertility is low, and so is the level of nitrogen. The sandy texture contributes to the leaching of nutrients, and frequent applications of lime and fertilizer are necessary. The reaction is strongly acid to very strongly acid.

Because of their low available moisture capacity, these soils should be kept in permanent vegetation. They can be used for permanent pasture, as woodland, or as wildlife habitats. If managed for pasture, they require fertilizer. Best results are obtained if the pastures are grazed in rotation and the grazing is concentrated during spring and early in summer. Livestock should be kept off the pasture during the dry summer months.

Wind erosion is a very severe hazard, and "blowouts" commonly occur if these soils are not protected by vegetation. Plantings of coniferous trees help to control wind erosion.

Predicted yields

The average predicted yields per acre of the principal field and forage crops grown on each soil are given in table 2. The predictions are based on interviews with farmers and on observations made by soil surveyors, work unit conservationists, and others who know the soils. In columns A are average yields that can be expected under a medium level of management, and in columns B are those that can be expected under a high level of management. The criteria for the two levels of management are defined in the following paragraphs. Some of these criteria vary according to whether the soils are in capability subclass *w*, *e*, or *s*.

Yields in columns A can be expected if (a) a pH level of 5.7 to 6.2 is maintained in subclass *e* and *s* soils and a level of 6.0 to 6.5 in subclass *w* soils; (b) phosphate (P_2O_5) is applied at the rate of 75 to 180 pounds per acre, potash (K_2O) is applied at the rate of 150 to 250 pounds per acre, and nitrogen (N) is applied at the rate of 60 pounds per acre the first year (the first year after a legume or for the first year of corn on subclass *w* soils) and at the rate of 100 pounds per acre all other years; (c) crop residue is lightly grazed or stalks left by mechanical pickers remain on the field; (d) cover crops are not planted; (e) soils are plowed and tilled by conventional methods and not plowed in the fall or when wet; (f) suitable varieties of crops are used, but not necessarily the latest or best varieties; (g) corn is planted to obtain a population of 14,000 to 18,000 plants per acre in rows 40 inches apart; (h) weeds and insects are controlled by limited spraying and conventional cultivation; and (i) subclass *w* soils are cropped without adequate drainage and subclass *e* and *s* soils are cropped without drainage.

Yields in columns B can be expected if (a) a pH level of 6.2 to 7.0 is maintained in subclass *e* and *s* soils and a level of 6.5 to 7.0 is maintained in subclass *w* soils; (b) phosphate (P_2O_5) is applied at the rate of 180 pounds or more per acre, potash (K_2O) at the rate of 250 pounds or more per acre, and nitrogen (N) at the rate of 100 pounds per acre for the first year of corn and at the rate of 140 pounds per acre all other years; (c) crop residue is incorporated into the surface soil or shredded and used as a mulch; (d) a cover crop is seeded with a row crop and left until another row crop is planted; (e) tillage is timely and kept to a minimum, and soils are not plowed in fall or when wet; (f) the best varieties of crops are used, as recommended by Purdue University or some other agricultural authority; (g) corn is planted to obtain a minimum population of 18,000 to 22,000 plants per acre in rows 40 inches apart; (h) weeds and insects are controlled by spraying to the extent necessary to maintain control and eliminate or reduce cultivation; (i) wet soils are drained by tile, open ditches, or surface drains, and small, wet areas are spot drained.

The yields in table 2 are averages that can be expected on a continual yearly basis. They take into account the year-to-year weather changes and the differences in management from one farm to another.

TABLE 2.—*Predicted average yields per acre of principal crops under two levels of management*

[Yields in columns A can be expected under a medium level of management; those in columns B can be expected under a high level of management; dashes indicate the soil is not suited to the crop or the crop is not ordinarily grown on the soil; miscellaneous land types are not included]

Soils	Corn [1]		Soybeans		Wheat		Oats		Alfalfa-grass hay		Clover-grass hay	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Abscota fine sandy loam	65	90	20	30	----	----	----	----	----	----	----	----
Ade loamy fine sand, 2 to 6 percent slopes	50	70	15	22	20	30	30	50	2. 2	3. 2	1. 2	1. 5
Aubbeenaubbee fine sandy loam, 0 to 2 percent slopes	65	80	24	28	28	35	45	65	2. 5	3. 5	2. 5	3. 0
Ayr fine sandy loam, 0 to 2 percent slopes	65	85	25	30	25	35	50	70	3. 0	4. 0	2. 5	3. 0
Berrien loamy fine sand, 0 to 2 percent slopes	40	60	15	20	20	30	30	45	2. 5	3. 2	1. 2	1. 5
Berrien loamy fine sand, 2 to 6 percent slopes	40	55	15	20	18	25	30	40	2. 5	3. 2	1. 2	1. 4
Blount loam, 0 to 2 percent slopes	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Brady fine sandy loam	65	80	24	28	28	35	45	65	2. 5	4. 0	2. 0	3. 0
Brady loamy fine sand	60	75	20	25	28	35	40	60	2. 0	3. 5	2. 0	3. 0
Bronson loamy sand, 0 to 2 percent slopes	45	65	15	22	20	30	30	45	2. 2	3. 2	1. 2	1. 5
Bronson sandy loam, 0 to 2 percent slopes	50	70	15	25	25	35	30	50	2. 5	3. 7	1. 2	1. 5
Brookston loam	80	115	35	40	35	45	60	80	3. 0	5. 0	2. 5	3. 0
Brookston mucky silt loam	80	115	35	40	35	45	60	80	3. 0	5. 0	2. 5	3. 0
Brookston silt loam	80	115	35	40	35	45	60	80	3. 0	5. 0	2. 5	3. 0
Brookston silty clay loam	80	115	35	40	35	45	60	80	3. 0	5. 0	2. 5	3. 0
Carlisle muck	85	110	25	35	----	----	----	----	----	----	----	----
Celina fine sandy loam, 0 to 2 percent slopes	60	80	25	30	25	35	50	70	3. 0	4. 0	2. 0	3. 0
Celina fine sandy loam, 2 to 6 percent slopes, moderately eroded	55	75	20	25	20	30	45	65	3. 0	4. 0	2. 0	3. 0
Celina loam, 0 to 2 percent slopes	70	95	30	40	37	45	60	80	3. 0	5. 0	2. 0	3. 0
Celina loam, 2 to 6 percent slopes, moderately eroded	65	90	25	35	37	45	55	75	3. 0	5. 0	2. 0	3. 0
Chelsea fine sand, 0 to 2 percent slopes	50	70	15	22	20	30	30	50	2. 5	3. 5	1. 2	1. 5
Chelsea fine sand, 2 to 6 percent slopes	45	65	15	20	20	25	30	45	2. 2	3. 2	1. 2	1. 5
Chelsea fine sand, 6 to 12 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
Chelsea fine sand, 12 to 18 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----
Conover loam, 0 to 2 percent slopes	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Conover silt loam, 0 to 2 percent slopes	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Corwin loam, 0 to 2 percent slopes	75	100	30	40	37	45	60	80	3. 0	5. 0	2. 0	3. 0
Corwin silt loam, 0 to 2 percent slopes	75	100	30	40	37	45	60	80	3. 0	5. 0	2. 0	3. 0
Corwin silt loam, 2 to 6 percent slopes, moderately eroded	75	95	30	40	37	45	60	80	3. 0	5. 0	2. 0	3. 0
Crosby fine sandy loam, 0 to 2 percent slopes	65	90	25	30	32	40	45	65	2. 5	4. 0	2. 0	3. 0
Crosby loam, 0 to 2 percent slopes	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Crosby silt loam, 0 to 2 percent slopes	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Crosby silt loam, 2 to 6 percent slopes	70	95	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Darroch loam	70	100	30	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Darroch loam, clay substratum	70	100	30	35	35	40	50	70	2. 0	3. 0	2. 5	3. 0
Darroch silt loam	70	100	35	35	35	40	50	70	3. 0	4. 0	2. 5	3. 0
Edwards muck	60	85	25	35	----	----	----	----	----	----	----	----
Eel loam	70	95	25	35	----	----	----	----	----	----	----	----
Foresman loam	70	90	25	35	32	40	50	65	3. 0	5. 0	2. 0	3. 0
Foresman fine sandy loam, sandy variant	60	80	22	28	25	35	40	55	3. 0	4. 0	2. 0	3. 0
Fox sandy loam, 0 to 2 percent slopes	55	75	15	25	23	35	30	50	2. 2	3. 5	1. 2	1. 5
Gilford fine sandy loam	75	95	30	40	35	45	50	70	----	3. 0	2. 5	3. 0
Gilford loam	80	100	35	40	35	45	50	70	----	3. 0	2. 5	3. 0
Gilford loam, ferruginous variant	80	100	35	40	35	45	50	70	----	3. 0	2. 5	3. 0
Homer sandy loam	65	80	25	30	32	40	45	65	2. 5	3. 5	2. 5	3. 0
Hoopeston fine sandy loam	60	80	25	30	32	40	45	65	2. 5	3. 5	2. 5	3. 0
Maumee fine sandy loam	75	95	30	40	35	45	50	70	----	3. 0	2. 0	3. 0
Maumee fine sandy loam, ferruginous variant	75	95	30	40	35	45	50	70	----	3. 0	2. 0	3. 0
Maumee loamy fine sand	75	90	25	35	35	45	45	65	----	3. 0	2. 0	3. 0
Maumee mucky fine sandy loam	75	95	30	40	35	45	50	70	----	3. 0	2. 0	3. 0
Mermill loam	80	115	35	40	35	45	60	80	----	----	2. 5	3. 0
Mermill silt loam	80	115	35	40	35	45	60	80	----	----	2. 5	3. 0
Metea loamy fine sand, 0 to 2 percent slopes	55	75	20	25	23	30	45	60	2. 5	3. 5	1. 5	2. 0
Metea loamy fine sand, 2 to 6 percent slopes	45	65	15	20	20	25	40	55	2. 0	3. 0	1. 2	1. 7
Miami fine sandy loam, 0 to 2 percent slopes	60	80	25	30	30	35	50	70	3. 0	4. 0	2. 0	3. 0
Miami fine sandy loam, 2 to 6 percent slopes	55	75	20	25	25	30	45	65	3. 0	4. 0	1. 7	2. 5
Miami fine sandy loam, 2 to 6 percent slopes, moderately eroded	55	75	20	25	25	30	45	65	3. 0	4. 0	1. 7	2. 5
Miami fine sandy loam, 6 to 12 percent slopes, moderately eroded	50	65	15	20	20	25	40	55	2. 5	3. 5	1. 5	2. 0

See footnote at end of table.

TABLE 2.—*Predicted average yields per acre of principal crops under two levels of management*—Continued

Soils	Corn [1]		Soybeans		Wheat		Oats		Alfalfa-grass hay		Clover-grass hay	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*
Miami loam, 0 to 2 percent slopes	70	95	30	40	35	45	60	80	3.0	5.0	2.0	3.0
Miami soils, 6 to 12 percent slopes, severely eroded	40	50	12	18	20	25	35	50	2.5	3.5	1.5	2.0
Montgomery silty clay	80	115	35	40	------	------	60	80	------	------	2.0	3.0
Morocco loamy fine sand	50	70	15	25	25	35	40	50	2.0	3.0	1.5	2.5
Newton loamy fine sand	65	80	20	30	30	40	40	60	------	3.0	2.0	3.0
Odell loam	70	100	30	35	35	40	50	70	3.0	4.0	2.5	3.0
Odell silt loam	70	100	30	35	35	40	50	70	3.0	4.0	2.5	3.0
Oshtemo fine sandy loam, loamy substratum, 0 to 2 percent slopes	60	80	25	30	25	30	45	65	3.0	4.0	1.5	2.0
Oshtemo fine sandy loam, loamy substratum, 2 to 6 percent slopes	55	75	20	25	20	25	40	60	3.0	4.0	1.5	2.0
Oshtemo loamy sand, 0 to 2 percent slopes	55	75	20	25	25	35	35	55	2.5	3.7	1.2	1.5
Oshtemo loamy sand, 2 to 6 percent slopes	45	65	15	20	20	25	30	50	2.2	3.2	1.2	1.5
Oshtemo loamy sand, 6 to 12 percent slopes	40	55	13	20	18	25	25	45	2.0	3.0	1.0	1.2
Oshtemo loamy fine sand, loamy substratum, 0 to 2 percent slopes	55	75	20	25	25	30	35	55	2.5	3.7	1.3	1.5
Oshtemo loamy fine sand, loamy substratum, 2 to 6 percent slopes	45	65	15	20	20	25	30	50	2.2	3.2	1.2	1.5
Parr loam, 2 to 6 percent slopes, moderately eroded	75	95	30	40	35	45	60	80	3.0	5.0	2.0	3.0
Plainfield fine sand, 0 to 2 percent slopes	40	60	15	20	20	30	30	40	2.2	3.2	1.2	1.5
Plainfield fine sand, 2 to 6 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Plainfield fine sand, 6 to 12 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Plainfield fine sand, 12 to 25 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Rensselaer loam	80	115	35	40	35	45	60	80	3.0	5.0	2.5	3.0
Rensselaer silt loam	80	115	35	40	35	45	60	80	3.0	5.0	2.5	3.0
Seward loamy fine sand, 2 to 6 percent slopes	50	70	15	25	23	30	30	50	2.0	3.0	1.5	2.0
Sloan loam, calcareous variant	80	105	30	40	------	------	------	------	------	------	------	------
Sloan silt loam, calcareous variant	80	105	30	40	------	------	------	------	------	------	------	------
Strole silt loam	75	110	35	40	35	43	60	80	------	------	2.0	3.0
Tawas muck	70	95	25	35	------	------	------	------	------	------	------	------
Wallkill silt loam	75	95	35	40	------	------	------	------	------	------	------	------
Washtenaw silt loam	75	105	35	40	35	43	60	80	3.0	5.0	2.0	3.0
Westland loam, moderately deep	80	115	35	40	35	45	60	80	3.0	5.0	2.5	3.0
Westland silt loam, moderately deep	80	115	35	40	35	45	60	80	3.0	5.0	2.5	3.0

Higher average yields of corn can be expected on Maumee, Gilford, Newton, Tawas, Carlisle, and other soils that are drained and subirrigated by a controlled water table system.

Higher average yields can be obtained by such special practices as subirrigation or surface irrigation. Subirrigation is a system of raising the water table by channeling water into deep open ditches or tile. Low-cost control dams are used in this system. This practice is well adapted to such soils as the Maumee, Gilford, and Tawas. Surface irrigation is not prevalent in the county now because it is not economically justifiable, except for crops of high value, but many of the soils are suitable for surface irrigation. Local personnel of the Soil Conservation Service can help in planning an irrigation system.

Woodland [1]

Hardwood timber originally covered about half of Pulaski County. The rest of the county was covered by marsh and prairie grass. Much of the present woodland is on the sandy soils in the northern part of the county and on the sand ridges throughout the rest of the county. According to the U.S. Census of Agriculture for 1959, 30,450 acres of woodland are privately owned. The State owns about 9,360 acres of woodland in the Jasper-Pulaski State Game Preserve, the Winamac State Fish and Game Area, and the Tippecanoe River State Park.

Upland oaks, tulip-poplar, and pin oak are the three principal woodland crops in Pulaski County. Upland oaks are predominant on the drier, well-drained sites. White oak, red oak, and black oak are the dominant trees in this crop; associated with them are white ash and tulip-poplar. Because of past management, tulip-poplar is rare in Pulaski County, but it was used in the rating of sites because it could become one of the dominant species to be managed in future stands. Other trees in the tulip-poplar woodland crop are white ash, red oak, basswood, white oak, beech, black walnut, and sugar maple. Pin oak grows on the poorly drained uplands, terraces, and bottom lands of the county. Associated with pin oak are soft maple, sweetgum, swamp white oak, elm, and ash.

Christmas trees also can be grown on some of the soils, and they produce more income per acre than native hardwoods (fig. 8).

[1] This section was prepared by JOHN HOLWAGER, woodland conservationist, Soil Conservation Service.

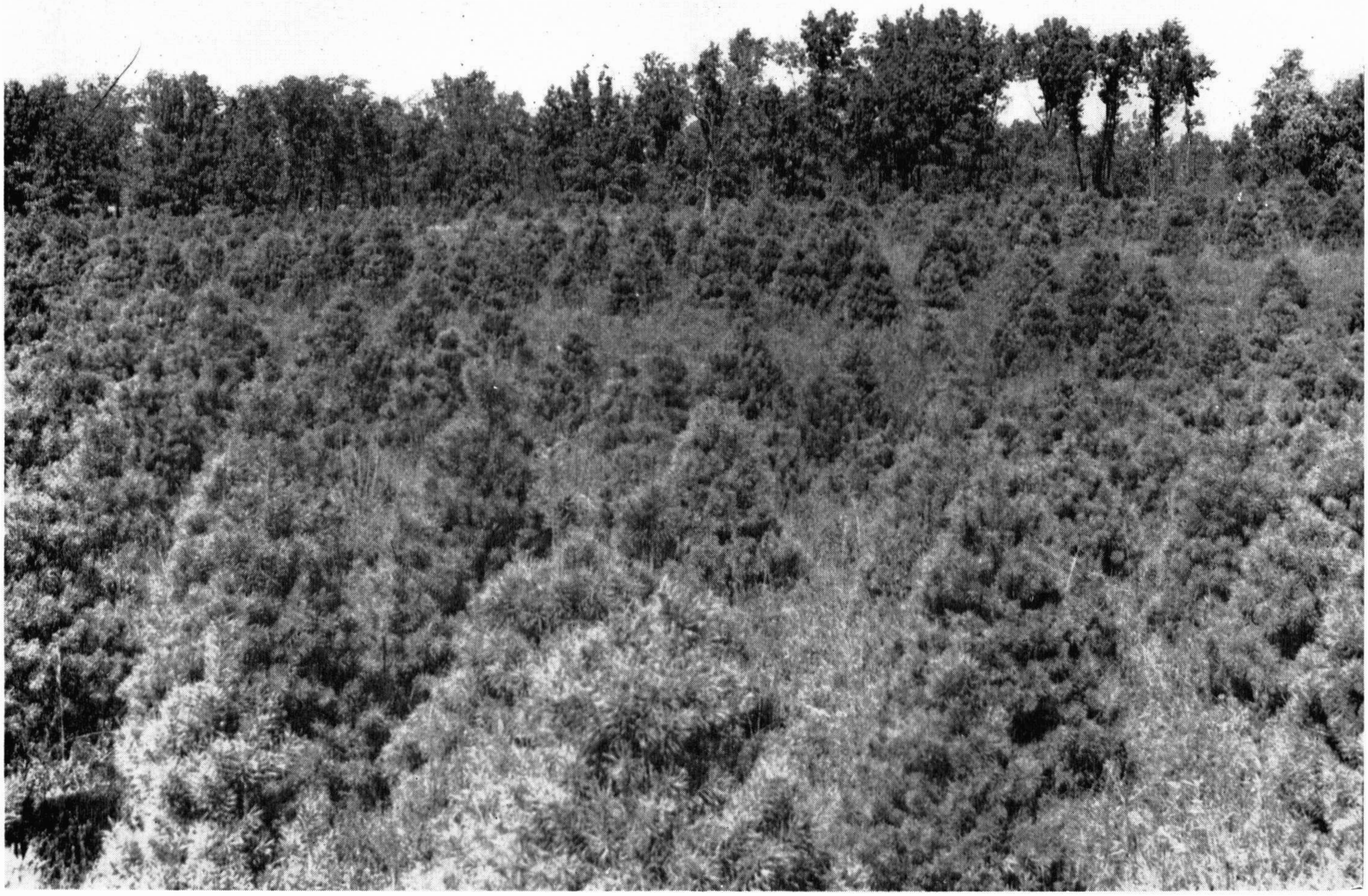

***Figure 8.*—Scotch pine Christmas tree plantation on soils in woodland suitability group 17. A regular program of shearing, brush control, and insect control is required.**

The soils of Pulaski County vary widely in their suitability for woodland crops. Among the most important soil characteristics that affect the growth of trees are moisture-supplying capacity and depth of root zone. Other important characteristics are aeration, natural fertility, thickness of surface layer, texture and consistence of soil material, depth to mottling, and depth to water table.

To assist woodland owners in planning the use of their soils, the soils of the county have been placed in eleven woodland suitability groups, which are described and listed in table 3. Each group is made up of soils that have similar characteristics that affect the growth of trees. Site index ratings for upland oaks, tulip-poplar, and pin oak are given for each group of soils on which these trees grow. Site index is the average height of the dominant trees in a stand at age 50. For example, a site index of 80 for upland oaks means that the dominant oak trees on a given site will average 80 feet in height at the age of 50 years.

In table 3, the site indexes were calculated by measuring the trees growing in more than 200 plots. The site indexes for upland oaks were based on data in USDA Tech Bul. 560 (*7*),[2] and those for tulip-poplar on USDA Tech Bul. 356 (*4*). For pin oak, the age-height data for sweetgum in the Forestry Handb. (*10*) were used, as there are no data available for bottom-land hardwoods.

Each woodland group in the table is rated according to the capabilities, limitations, and hazards of the soils for woodland use. The groups are numbered on a statewide basis, and some of the groups do not occur in Pulaski County. Consequently, the group numbers are not consecutive. The terms used in rating the groups are defined in the following paragraphs.

Seedling mortality refers to the expected degree of mortality of natural seedlings or planted stock, as influenced by the kind of soil, the hazard of erosion, and the direction of slope. The rating is "slight" if natural regeneration ordinarily is adequate, or if not more than 25 percent of planted seedlings is expected to die. Mortality is rated as "moderate" if natural regeneration may not be adequate within a normal period, or if 25 to 50 percent of the seedlings is expected to die. In some places replanting may be necessary to fill open spaces.

[2] Italic numbers in parentheses refer to Literature Cited, p. 82.

TABLE 3.—*Suitability of soils*

Woodland suitability groups	Hazards and limitations		
	Site index [1]	Seedling mortality	Erosion
Group 1: Deep, moderately coarse textured and medium-textured soils; moderately well drained and well drained; slope range 0 to 12 percent; moderate permeability; high available moisture capacity; slow to medium runoff.	Upland oaks, 85–95; tulip-poplar, 90–105.	Slight to moderate.	Slight to moderate
Group 2: A level, moderately deep, moderately coarse textured soil; well drained; moderate permeability; moderate available moisture capacity; slow runoff.	Upland oaks, 85–95; tulip-poplar, 95–105.	Slight	Slight
Group 5: Deep, moderately coarse textured and medium-textured soils on uplands and terraces; somewhat poorly drained; nearly level and gently sloping; moderately slow and slow permeability; moderate to high available moisture capacity; slow runoff; high water table.	Upland oaks, 80–90; tulip-poplar, 90–100; pin oak, 85–100.	Slight	Slight
Group 8: Deep, moderately coarse textured and medium-textured, level soils on bottom lands; moderately well drained and well drained; moderate permeability; high available moisture capacity; slow runoff; seasonal flooding.	Tulip-poplar, 95–105	Slight	Slight
Group 11: Moderately deep and deep, medium-textured, moderately fine textured, and fine textured soils in level areas and depressions surrounded by cropland; poorly drained; very slow or slow permeability; high available moisture capacity; very slow or ponded runoff; seasonal high water table.	Upland oaks, 95–105; tulip-poplar, 90–105; pin oak, 85–105.	Moderate	Slight
Group 15: Moderately deep and deep, coarse textured and moderately coarse textured soils; well drained; slope range 2 to 6 percent; moderately rapid permeability; moderate available moisture capacity; slow to medium runoff; droughtiness on steep slopes.	Upland oaks, 80–85; tulip-poplar, 75–85.	Slight	Slight water erosion; moderate wind erosion.
Group 16: Small areas of miscellaneous land types consisting of sloping soil material and spoil piles; water filled and ponded in some areas; moderate to slow permeability; moderate available moisture capacity; medium runoff.		Slight	Slight to moderate
Group 17: Deep, coarse textured and moderately coarse textured sandy and gravelly soils; well drained; slope range 0 to 25 percent, but most slopes not steeper than 12 percent; rapid permeability; low available moisture capacity; slow runoff; well suited to Christmas trees.	Upland oaks, 65–75	Slight to moderate.	Slight water erosion; moderate wind erosion.
Group 20: Deep, moderately coarse textured to coarse textured, somewhat poorly drained, level soils; moderate to rapid permeability; low available moisture capacity; slow runoff; seasonal high water table.	Upland oaks, 50–60	Slight	Slight water erosion; severe wind erosion in unprotected areas.
Group 21: Deep, moderately coarse textured and coarse textured, very poorly drained soils in level areas and depressions; rapid permeability; low available moisture capacity; very slow or ponded runoff; seasonal high water table.		Slight	Slight water erosion; severe wind erosion.
Group 23: Prairie soils and organic soils that are unimportant as woodland and are not rated according to their suitability for trees. Tree planting should be considered only for windbreaks.			

[1] Absence of site index for any species indicates the species does not occur as a major crop, or measurement is not feasible.

The rating is "severe" if considerable replanting, special preparation of seedbed, and use of superior planting techniques are required, or if more than 50 percent of the planted seedlings is expected to die.

The *erosion hazard* is the degree of potential erosion that is likely to occur if the soil is used as woodland. The hazard is "slight" if problems of erosion control are unimportant; "moderate" if some attention must be given to prevention of unnecessary soil erosion; and "severe" if intensive treatment, special equipment, and special methods of operation must be used.

Windthrow hazard is the danger of trees being blown over by wind. It depends on soil characteristics that control development of tree roots and affect windfirmness. The rating is "slight" if there is no special problem, and trees would be expected to remain standing if released on all sides; "moderate" if some trees are expected to blow down during periods of excessive soil wetness and high wind; and "severe" if many trees are expected to blow down during periods of soil wetness and moderate or high winds.

Equipment limitation is rated on the basis of soil characteristics that restrict the use of equipment commonly required for tending and harvesting the woodland crop. The limitation is "slight" if there is no restriction on the kind of equipment and the time of year it can be used; "moderate" if there is a seasonal restriction of less than 3 months, or if slope, stones, or some other factor moderately restricts the use of equipment; and "severe" if there is a seasonal restriction of more *for use as woodland*

Hazards and limitations—Con.		Species preferred—			
		For managing in natural stands			For planting
Windthrow	Equipment limitation	Most desirable	Acceptable	Least desirable	
Slight	Slight	Tulip-poplar, white ash, red oak, black walnut, white oak.	Black oak, sugar maple, red elm, beech.	Hickory, blackgum, white elm, soft maple.	White pine, black locust, red pine.
Slight	Slight	Tulip-poplar, white ash, red oak, black walnut, white oak.	Black oak, sugar maple, red elm, beech.	Hickory, blackgum, white elm, soft maple.	White pine, black locust, red pine.
Moderate to severe.	Moderate	Pin oak, soft maple, white ash, tulip-poplar, swamp white oak, bur oak.	Sycamore, white oak, red elm, shingle oak, red river birch.	White elm, beech, hickory, blackgum.	White pine, soft maple, sycamore.
Slight	Slight	Cottonwood, sycamore, tulip-poplar, black walnut, white ash.	Red maple, bur oak, swamp chestnut oak, swamp white oak.	Boxelder, willow, white elm, honeylocust, hickory, silver maple.	White pine, cottonwood, black locust, sycamore, black walnut.
Moderate to severe.	Severe	Pin oak, soft maple, bur oak, white ash, tulip-poplar, swamp white oak.	Sycamore, white oak, red elm, shingle oak, aspen.	White elm, beech, hickory, blackgum.	Planting rarely necessary.
Slight	Slight to moderate.	Black oak, tulip-poplar, red oak, white oak, black walnut.	White ash, post oak, scarlet oak.	Blackgum, hickory, sugar maple, sassafras.	White pine, jack pine, red pine.
Slight	Severe	Cottonwood, sycamore, soft maple, green ash.	Sassafras, red oak, white ash, black cherry, aspen.	White elm, black willow, boxelder, honeylocust.	White pine, red pine, jack pine.
Slight	Slight to moderate.	White oak, black oak, red oak, black cherry.	Scarlet oak, black walnut, sassafras, aspen.	Hickory, dogwood, blackgum.	Jack pine, red pine, scotch pine, white pine.
Moderate	Moderate	Red maple, pin oak, cottonwood, aspen, bur oak.	Hickory, black oak, red river birch, white oak, swamp white oak.	Willow, sassafras, silver maple.	Natural regeneration; planting not necessary.
Moderate	Moderate to severe.	Pin oak, red maple, aspen, soft maple, white ash.	Hickory, black oak, black cherry, silver maple.	Blackgum, honeylocust, white elm.	Natural regeneration; planting not necessary.
----------	----------	----------	----------	----------	White pine, red pine, Norway spruce, arborvitae.

than 3 months, or special equipment is needed and its use is severely restricted by slope, stones, or some other factor or by lack of safety in operations.

Species preferred in natural stands are the trees that commonly grow on the soils. The "most desirable" are those that have the best combination of market value and rate of growth. The "acceptable" species have a moderate value and a moderate rate of growth. The "least desirable" have the lowest value and the lowest rate of growth. Markets are not static in a local area, however, and a change in demand for a particular product might change the preference rating of a species.

Species preferred for planting are those considered most desirable, and they are listed in order of preference. All of the suitable trees are not listed in table 3. For a complete list of suitable trees, refer to the Service Forester, Division of Forestry, Department of Natural Resources, State of Indiana.

Wildlife

A well-planned and managed system of farming maintains the productivity of the soils for crops and pasture and provides food and cover for wildlife. In contrast, farming that depletes the soils also reduces wildlife food and cover and thus reduces the population of desirable wildlife. This leads to an increase in the number of insects, rodents, and other destructive species. On most farms, habitats for wildlife can be improved by practices that supply food and cover (*2*).

To maintain a maximum population of wildlife on a farm, as many areas as practical should be developed on a given land unit. Developing a single wildlife area is good, but it is important to develop travel lanes and different kinds of food and habitats on the entire farm in order to increase the carrying capacity for desirable wildlife and to maintain a balance between food and cover.

On only a few farms in the county is the balance ideal between cover and food for wildlife. Many farms consist almost entirely of soils in capability classes I, II, and III. These soils are used primarily for grain crops. On these soils food for wildlife may be abundant, but year-round cover is scarce. Other farms consist largely of class IV, VI, and VII soils, which are mostly woodland. The woodland provides ample cover, but food has to be obtained from the surrounding cropland.

Soils in the different classes can be managed so that both food and cover are available. On the soils in classes I, II, and III, where food is ample but cover is scarce, cover can be provided by fence rows, by vegetation on banks of ditches and streams, by windbreaks, and by perennial field borders. In addition to these places of cover, odd areas in fields and areas around ponds and in marshes can be used for both food and cover on soils in classes III and IV. On class VII soils, wildlife borders that produce seed and fruit can be planted, and small areas can be planted in grasses and conifers.

Kinds of wildlife

The kinds of wildlife that live in an area are related to the kinds of soils and other environmental factors in that area. Therefore, the kinds of wildlife in Pulaski County are discussed according to their relationship to the eight soil associations, which are described in the section "General Soil Map." Most kinds of wildlife that are common in Indiana live in Pulaski County, but their numbers vary from one soil association to another. Information about the different kinds of wildlife can be obtained from the Division of Fish and Game, Department of Natural Resources, State of Indiana.

Bobwhite quail have an average population of about a half covey per 100 acres of farmland, but some populations of one and a half coveys per 100 acres are found on quail ranges in soil associations 3, 4, and 8.

Ringneck pheasants are most plentiful in soil associations 1, 2, and 6, especially on the Odell and Corwin prairie soils in the southwestern part of the county.

Ducks and geese migrate along the Tippecanoe River and feed on waste grain left in adjoining fields by mechanical cornpickers. Canada geese, blue geese, and snow geese graze on some of the green growth of fall-seeded small grain. Mallards and black ducks are the most numerous of more than 25 species of waterfowl that migrate along the flight lanes in the county in spring and fall. A few mallards and blue-winged teals nest in open idle areas and meadows near water. Wood ducks commonly nest in hollow trees and compete with raccoons for trees near water where they can raise a brood of young. Eel and Sloan soils are typical of the soils along the migration lanes.

Songbirds of many kinds are present throughout most of the year. Besides helping to control insects, songbirds provide pleasure to people who enjoy having them about their homes. Grain is usually plentiful for birds until heavy snows cover the crop residue. A patch of grain sorghum planted near escape cover is effective in attracting the seed-eating birds. Such food patches can be grown on all of the soils except the Plainfield and Chelsea soils, which are most extensive in soil association 3. Fruit-producing shrubs provide both food and nesting sites.

Deer live where there is heavy cover, generally along the river and larger drainageways and in the scattered woodlands. Eel and Sloan soils are typical of those along the river. Plainfield and Chelsea soils on sand ridges are typical of the woodland soils. Water for deer is well distributed by the 43 miles of the Tippecanoe River plus 750 miles of large drainage ditches. Deer, as well as many other kinds of wildlife, use salt blocks, especially when the salt is a bonus to adequate food, cover, and water. Free-running dogs and illegal shooting can hold deer population to a low level, even though other habitat requirements are satisfactory.

Rabbits and squirrels are the most abundant game mammals. Rabbits prefer farmland, especially edges of fields, where they can obtain food and cover. Squirrels require a wooded habitat and live mostly in woodland on the sand ridges in soil association 3. Fox squirrels are plentiful in small woodlots adjoining cultivated areas.

Fish in the Tippecanoe River include smallmouth and largemouth bass, bluegill, northern pike, channel cat, rock bass, and other sport fish, as well as carp, sucker, buffalo, and pan fish.

Furbearing animals. such as raccoon, muskrat, mink, beaver, skunk, and opossum, are hunted and trapped by sportsmen in Pulaski County. More than 16,000 pelts were harvested in the county during the 1962–63 season. Muskrats lead the list, followed by mink, raccoon, and beaver. Nutria, which are marsh rodents imported from South America, have been discovered and removed from the county. Nutria compete with native muskrat by consuming large quantities of vegetation. They are not so desirable as muskrat and should not be imported and released.

Preying animals and birds, including foxes, hawks, and owls, are numerous. Most of these predators are of value to us for the large numbers of mice and other rodents they consume, although an individual predator may have to be controlled occasionally.

Engineering [3]

Soils are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. The properties of soils that most affect construction are permeability to water, shear strength, compaction characteristics, drainage, shrink-swell characteristics, grain size, plasticity, and pH. Topography and depth to water table or to bedrock also are important.

[3] MAX L. EVANS, civil engineer, Soil Conservation Service, assisted in preparing this section.

This soil survey report contains information that can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing sites for industrial, business, residential, and recreational purposes.
2. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning detailed soil surveys of the selected locations.
3. Develop information for the design of drainage systems, farm ponds, diversion terraces, and other structures for soil and water conservation.
4. Locate possible sources of sand and gravel.
5. Correlate performance of structures with soil mapping units and, thus, develop information that can be used in designing and maintaining new structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published sources and make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Tables 4, 5, and 6 contain data on the engineering properties of the soils. Only the data in table 4 are from actual laboratory tests. The estimates in table 5 and the interpretations in table 6 are based on comparisons of soils with those tested. At any construction site, the soils may vary greatly within the depth of the proposed excavations, and several soils may occur within one site. Although the detailed soil map and the tables serve as a guide for evaluating most soils, a detailed investigation at the site of the proposed construction is needed because as much as 15 percent of an area designated as a specific soil on the map may consist of areas of other soils too small to be shown on the published map.

In addition to this section of the report and the detailed soil map, engineers may want to refer to the section "Formation, Classification, and Morphology of Soils," which contains technical descriptions of the soil profiles.

Engineering classification systems

Two systems for classifying soils are in general use among engineers. They are the system used by the American Association of State Highway Officials (AASHO) (*1*) and the Unified system developed by the Corps of Engineers (*13*). Both are used in this report and are explained in the Soil Primer published by the Portland Cement Association (*5*).

In the AASHO system, all soil materials are classified in seven principal groups on the basis of mechanical analyses and plasticity tests. The groups range from A–1 (gravelly soils of high bearing capacity, the best soils for subgrades) to A–7 (clay soils having low strength when wet, the poorest soils for subgrades). Highly organic soils, such as peat and muck, are not included in this classification. Their use as a construction material should be avoided.

For each of the principal groups, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number, when used, is in parentheses following the classification symbol. The AASHO classification of soils tested is given in table 4. The estimated AASHO classification of all the soils in the county is given in table 5.

The Unified classification system is based on classification of soils according to their texture and plasticity and their performance as engineering construction materials. Soils are classified as coarse textured, fine textured, or organic. Table 4 shows the Unified classification of the soils tested, and table 5 the estimated Unified classification of all soils in the county.

Soil test data

Table 4 presents test data on samples of four soil series in the county. These samples were tested by standard procedures in the laboratories of Purdue University under sponsorship of the Bureau of Public Roads. The samples do not represent all of the soils in Pulaski County, nor do they include the entire range of characteristics of each series sampled, and not all layers of each profile were sampled. The test results, however, have been used as a general guide in estimating the engineering properties of the soils of the county.

The mechanical analyses, which determine the particle-size distribution of the soil material, were made by combining the sieve and hydrometer methods.

The liquid limit and plasticity index measure the effect of water on the consistence of soil material. The plastic limit is the moisture content at which the material changes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material changes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Moisture-density relationships indicate the moisture content at which soil material can be compacted to maximum dry density. The relationship of soil moisture to density is important in planning earthwork, for generally the soil is most stable if compacted to its maximum dry density when it is at approximately the optimum moisture content.

The California bearing ratio test measures the load-bearing capacity of soil material.

260-263—67——4

TABLE 4.—*Engineering*

[Tests performed by Purdue University in cooperation with Indiana State Highway Department and U.S. Department of Commerce, except

Soil name and location	Parent material	Purdue report No.	Depth	Horizon	Moisture-density [1]: Maximum dry density	Moisture-density [1]: Optimum moisture	California bearing ratio test [2], Molded specimen: Dry density	California bearing ratio test [2], Molded specimen: Moisture content
			Inches		*Lb. per cu. ft.*	*Percent*	*Lb. per cu. ft.*	*Percent*
Foresman fine sandy loam, sandy variant:								
NE¼SE¼NE¼ sec. 31, T. 30 N., R. 4 W. (Modal).	Stratified silt and sand.	66–8–1	0 to 10	Ap	112	16	(6)	(6)
		66–8–2	23 to 35	B12	114	13	113. 3	13. 0
		66–8–3	47 to 60	C	114	15	112. 3	14. 4
NW¼SW¼NW¼ sec. 28, T. 30 N., R. 4 W. (Coarser textured than modal).	Stratified outwash sand and silt.	66–7–1	0 to 9	Ap	114	13	111. 0	13. 1
		66–7–2	33 to 45	B31	111	14	110. 2	13. 8
		66–7–3	56 to 69	C	104	16	103. 9	15. 9
SW¼SW¼NE¼ sec. 31, T. 30 N., R. 4 W. (Finer textured than modal).	Stratified outwash sand and silt.	66–9–1	0 to 11	Ap	112	16	(6)	(6)
		66–9–2	33 to 43	B22	118	13	117. 9	12. 3
		66–9–3	50 to 60	C	124	12	125. 0	10. 3
Maumee fine sandy loam:								
NW¼NE¼NW¼ sec. 14, T. 30 N., R. 4 W. (Modal).	Outwash sand.	66–11–1	0 to 10	Ap	110	14	108. 2	12. 4
		66–11–2	16 to 28	Bg	110	12	110. 0	12. 0
		66–11–3	28 to 40	Cg	106	15	105. 5	15. 1
SW¼SW¼SE¼ sec. 34, T. 31 N., R. 3 W. (Coarser textured than modal).	Outwash sand.	66–10–1	0 to 10	Ap	108	14	104. 9	14. 0
		66–10–2	34 to 52	C2g	103	16	102. 0	15. 2
NE¼NE¼NW¼ sec. 13, T. 30 N., R. 4 W. (Finer textured than modal).	Outwash sand.	66–12–1	0 to 10	Ap	109	16	108. 2	15. 1
		66–12–2	10 to 20	AB	114	14	113. 1	13. 3
		66–12–3	32 to 46	C1g	107	14	105. 8	13. 5
Plainfield fine sand:								
NW¼NW¼SW¼ sec. 12, T. 31 N., R. 4 W. (Modal).	Eolian sand.	66–3–1	0 to 4	A1	103	16	100. 2	16. 3
		66–3–2	8 to 18	B11cr	110	12	109. 9	11. 5
		66–3–3	26 to 60	C	104	14	104. 6	12. 7
SW. cor. of SW¼NW¼NW¼ sec. 3, T. 30 N., R. 1 W. (Near the modal).	Eolian sand.	66–2–1	0 to 7	Ap1	113	11	114. 3	10. 8
		66–2–2	10 to 24	B11cr	112	11	112. 7	11. 3
		66–2–3	32 to 60	C	107	12	108. 2	11. 3
NE¼SE¼SE¼ sec. 29, T. 29 N., R. 1 W. (Toward Chelsea series).	Eolian sand (Wisconsin age).	66–1–1	0 to 5	A1	107	13	108. 2	12. 3
		66–1–2	15 to 42	B12cr	109	13	109. 0	12. 4
		66–1–3	42 to 60	C	107	10	106. 3	9. 9
Rensselaer silt loam:								
NW¼SW¼SW¼ sec. 32, T. 30 N., R. 4 W. (Modal).	Stratified sand and silt and some clay (Wisconsin age).	66–4–1	0 to 9	A1p	104	19	101. 8	18. 0
		66–4–2	16 to 25	B22	119	13	118. 2	12. 6
		66–4–3	25 to 34	C1	119	13	118. 7	12. 2
NE¼NE¼NW¼ sec. 31, T. 30 N., R. 4 W.	Stratified sand and silt.	66–5–1	0 to 8	Ap	101	21	99. 4	21. 0
		66–5–2	12 to 24	B21	118	13	118. 8	12. 3
		66–5–3	31 to 45	C1	122	12	122. 2	10. 8
NW¼SW¼NW¼ sec. 29, T. 30 N., R. 4 W. (Coarser textured than modal).	Outwash sand and some silt.	66–6–1	0 to 7	Ap	101	21	(6)	(6)
		66–6–2	18 to 26	B22g	114	13	115. 0	13. 0
		66–6–3	51	C2	104	14	102. 8	13. 6

[1] Based on AASHO Designation T 99–57, Method A (*1*).

[2] The soil sample is prepared according to AASHO Designation T 87–49 (*1*). Water is added to bring moisture content to within ±0.5 percent of optimum. Specimen is compacted according to AASHO Designation T 99–57, Method B, to within ±1 pound per cubic foot of maximum dry density, a surcharge of 35 pounds is added, and the specimen is soaked from top and bottom for 4 days. The penetration is performed at a rate of 0.05 inch per minute, while the 35-pound surcharge is on the specimen. The CBR value is for 0.1-inch penetration.

[3] Mechanical analyses according to AASHO Designation T 88–57 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all

test data

Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO)(*1*), CBR test]

California bearing ratio test [2]—Continued		Mechanical analysis [3]									Liquid limit	Plasticity index	Classification	
		Percentage passing sieve—					Percentage smaller than—							
CBR	Swell	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [4]	Unified [5]
Percent	*Percent*													
(6)	(6)	------	------	100	97	35	31	27	16	13	22	1	A-2-4(0)	SM.
22	0	------	------	100	96	20	18	15	13	13	(7)	(7)	A-2-4(0)	SM.
6	.95	------	------	100	98	82	78	70	45	27	29	13	A-6(9)	CL.
13	—.51	------	------	100	98	35	28	19	12	10	(7)	(7)	A-2-4(0)	SM.
50	0	------	------	100	99	50	30	17	12	12	(7)	(7)	A-4(3)	SM.
33	0	------	------	------	100	22	14	12	11	11	(7)	(7)	A-2-4(0)	SM.
(6)	(6)	------	------	100	99	35	31	26	18	12	(7)	(7)	A-2-4(0)	SM.
18	—.16	------	------	100	99	30	28	25	25	24	(7)	(7)	A-2-4(0)	SM.
12	0	------	100	99	96	45	38	32	21	17	16	2	A-4(2)	SM.
22	.07	------	------	100	98	19	17	15	9	3	(7)	(7)	A-2-4(0)	SM.
35	—.04	------	------	100	98	12	10	9	8	8	(7)	(7)	A-2-4(0)	[8] SP-SM.
37	.13	------	------	100	96	9	9	9	9	9	(7)	(7)	A-3(0)	SP-SM.
13	.02	------	------	100	98	19	16	13	10	10	(7)	(7)	A-2-4(0)	SM.
22	0	100	99	98	96	3	------	------	------	------	(7)	(7)	A-3(0)	SP.
11	—.27	------	------	100	98	24	21	18	11	8	(7)	(7)	A-2-4(0)	SM.
19	—.47	------	------	100	99	18	17	15	11	10	(7)	(7)	A-2-4(0)	SM.
30	.07	------	100	99	94	12	11	10	10	10	(7)	(7)	A-2-4(0)	[8] SP-SM.
12	—.20	------	------	100	98	7	------	------	------	------	(7)	(7)	A-3(0)	[8] SP-SM.
24	—.16	------	------	100	99	6	------	------	------	------	(7)	(7)	A-3(0)	SP-SM.
25	—.20	------	------	------	100	1	------	------	------	------	(7)	(7)	A-3(0)	SP.
24	—.02	------	------	100	99	17	13	10	9	9	(7)	(7)	A-2-4(0)	SM.
12	—.11	------	------	100	99	3	------	------	------	------	(7)	(7)	A-3(0)	SP.
25	—.07	------	------	100	94	2	------	------	------	------	(7)	(7)	A-3(0)	SP.
20	—.38	------	------	100	99	8	------	------	------	------	(7)	(7)	A-3(0)	[8] SP-SM.
27	—.16	------	------	------	100	3	------	------	------	------	(7)	(7)	A-3(0)	SP.
16	—.24	------	------	100	99	3	------	------	------	------	(7)	(7)	A-3(0)	SP.
5	.51	------	------	100	98	57	47	40	25	16	33	12	A-6(5)	CL.
10	.09	------	------	100	98	50	41	35	27	20	28	14	A-6(4)	SC.
18	—.13	------	100	98	96	45	29	19	15	11	(7)	(7)	A-4(2)	SM.
3	.51	------	------	------	100	36	35	31	17	12	34	11	A-6(0)	[8] SM-SC.
12	.11	------	------	100	99	42	36	31	22	18	25	9	A-4(1)	SC.
20	0	100	99	99	97	55	50	42	27	20	21	9	A-4(4)	CL.
(6)	(6)	------	------	100	99	36	30	22	13	10	30	(7)	A-4(0)	SM.
21	—.31	------	------	100	99	25	20	17	13	14	(7)	(7)	A-2-4(0)	SM.
18	—.71	------	------	100	99	12	9	7	7	7	(7)	(7)	A-2-4(0)	[8] SP-SM.

the material, including that coarser than 2 millimeters in diameter. In the SCS procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soil.

[4] Based on AASHO Designation M 145-49 (*1*).

[5] Based on the Unified Soil Classification System (*13*).

[6] Insufficient material to perform the CBR test.

[7] Nonplastic.

[8] Soil Conservation Service and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. Examples of borderline classifications are SP-SM and SM-SC.

TABLE 5.—*Estimated*

Soil name	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Abscota (Ab)	2 to 3	0 to 13	Fine sandy loam	SM	A-2
		13 to 30	Loamy fine sand	SM	A-2
Ade (AdB)	4 to 6+	0 to 29	Loamy fine sand	SM	A-2
		29 to 52	Alternating layers of loamy fine sand and sand.	SM	A-2
		52 to 70	Fine sand	SP or SM	A-3
Aubbeenaubbee (AuA)	1 to 3	0 to 30	Fine sandy loam to loamy sand	SM	A-2
		30 to 46	Sandy clay loam to clay loam	CL	A-4
		46 to 54	Loam till	ML	A-4
Ayr (AyA)	3 to 4	0 to 29	Fine sandy loam to loamy fine sand.	SM	A-2
		29 to 40	Clay loam	CL	A-4
		40 to 45	Loam till	ML	A-4
Berrien (BcA, BcB)	2 to 3	0 to 9	Loamy fine sand	SM	A-2
		9 to 60	Fine sand	SP	A-3
Blount (BaA)	1 to 3	0 to 8	Loam	ML	A-4
		8 to 19	Light clay loam to light silty clay	CL	A-6
		19 to 29	Silty clay	CH	A-7
		29 to 42	Silty clay loam till	CL	A-7
Brady (Bd, Bf)	1 to 3	0 to 22	Loamy fine sand to fine sandy loam	SM	A-2
		22 to 46	Sandy loam to heavy sandy loam	SM	A-4
		46 to 60	Sand	SW-SM	A-1
Bronson (BgA, BmA)	1 to 3	0 to 27	Loamy sand	SM	A-2
		27 to 49	Sandy loam to light sandy loam	SM	A-2
		49 to 65	Sand	SW-SM	A-1
Brookston (Bn, Bo, Br, Bs)	0 to 2	0 to 11	Silt loam	ML or CL	A-6
		11 to 40	Light clay loam to clay loam	CL	A-6
		40 to 45	Loam till	ML	A-4
Carlisle (Ca)	0 to 2	0 to 30	Muck	Pt	A-7
		30 to 44	Peat	Pt	A-7
Celina (CbA, CbB2, CeA, CeB2)	2 to 3	0 to 14	Fine sandy loam	SM or ML	A-4
		14 to 21	Loam	ML or CL	A-4
		21 to 37	Clay loam	CL	A-6
		37 to 48	Loam till	ML	A-4
Chelsea (ChA, ChB, ChC, ChD)	4 to 6+	0 to 45	Fine sand	SP-SM	A-3
		45 to 70	Alternating layers of loamy fine sand and fine sand.	SM	A-2
Clay pits (Cl) (Properties were not estimated).					
Conover (CmA, CnA)	1 to 3	0 to 13	Loam	ML	A-6
		13 to 28	Clay loam	CL	A-6
		28 to 42	Loam till	ML	A-4
Corwin (CoA, CrA, CrB2)	2 to 3	0 to 15	Loam	ML	A-6
		15 to 24	Light clay loam	ML or CL	A-4
		24 to 31	Clay loam	CL	A-6
		31 to 42	Loam till	ML	A-4
Crosby (CsA, CtA, CuA, CuB)	1 to 3	0 to 16	Fine sandy loam and loam	SM or ML	A-4
		16 to 32	Clay loam	CL	A-6
		32 to 42	Loam till	ML	A-4

See footnotes at end of table.

properties of soils

Percentage passing sieve— No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Frost action potential	Shrink-swell potential
			Inches per hour	*Inches per inch of soil*	*pH value*		
90 to 100	85 to 90	25 to 35	2. 5 to 5	0. 10	6. 1 to 6. 5	Moderate	Low.
90 to 100	85 to 90	15 to 20	5 to 10	. 07	6. 6 to 7. 3	Low	Low.
100	80 to 85	15 to 20	5 to 10	. 07	5. 1 to 6. 0	Low	Low.
100	85 to 90	20 to 25	5 to 10	. 06	5. 1 to 6. 3	Low	Low.
100	80 to 85	5 to 10	5 to 10	. 05	5. 6 to 6. 5	Low	Low.
95 to 100	75 to 80	25 to 35	5 to 10	. 09	5. 1 to 6. 5	Low to moderate	Low.
95 to 100	70 to 75	50 to 60	0. 2 to 0. 8	. 18	5. 6 to 6. 5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
100	75 to 80	25 to 35	5 to 10	. 09	4. 5 to 6. 0	Low to moderate	Low.
95 to 100	70 to 75	55 to 65	0. 2 to 0. 8	. 18	5. 6 to 6. 0	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
100	95 to 100	15 to 20	5 to 10	. 07	5. 6 to 6. 0	Low	Low.
100	95 to 100	0 to 5	5 to 10	. 05	5. 1 to 5. 5	Low	Low.
100	90 to 100	65 to 75	0. 8 to 2. 5	. 18	5. 6 to 6. 0	Moderate	Low.
95 to 100	90 to 95	75 to 85	0. 2 to 0. 8	. 16	5. 6 to 6. 0	Moderate	
95 to 100	95 to 100	80 to 90	0. 5 to 0. 2	. 16	6. 1 to 6. 5	Moderate	High.
95 to 100	90 to 100	80 to 90	0. 2 to 0. 8	. 19	(1)	Moderate	Moderate.
95 to 100	75 to 80	25 to 35	5 to 10	. 09	5. 1 to 5. 5	Low to moderate	Low.
90 to 100	70 to 80	35 to 45	2. 5 to 5	. 13	5. 0 to 6. 1	Moderate	Low.
90 to 100	45 to 50	5 to 10	5 to 10	. 04	(2)	Low	Low.
95 to 100	75 to 80	20 to 25	5 to 10	. 07	4. 8 to 6. 8	Low to moderate	Low.
95 to 100	80 to 85	25 to 30	2. 5 to 5	. 10	5. 6 to 6. 5	Moderate	Low.
90 to 100	45 to 50	5 to 10	5 to 10	. 04	(2)	Low	Low.
100	90 to 100	65 to 75	0. 8 to 2. 5	. 23	6. 6 to 7. 3	Moderate to high	Low to moderate.
100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	6. 6 to 7. 3	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low to moderate.
----------	----------	----------	2. 5 to 5. 0	. 25+	6. 6 to 7. 3	Low	Low.
----------	----------	----------	2. 5 to 5. 0	. 25	5. 6 to 6. 0	Low	Low.
90 to 100	70 to 80	45 to 55	2. 5 to 5	. 13	5. 6 to 6. 5	Moderate	Low.
95 to 100	65 to 70	50 to 60	0. 8 to 2. 5	. 16	6. 1 to 6. 5	Moderate	Low to moderate.
95 to 100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	6. 1 to 6. 5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
100	95 to 100	5 to 10	5 to 10	. 05	4. 5 to 5. 5	Low	Low.
100	85 to 90	20 to 25	5 to 10	. 06	5. 1 to 6. 0	Low	Low.
----------	----------	----------	----------	----------	----------	----------	
95 to 100	90 to 100	65 to 75	0. 8 to 2. 5	. 18	5. 1 to 5. 5	Moderate	Low.
95 to 100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	5. 6 to 6. 5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
90 to 100	70 to 80	55 to 65	0. 8 to 2. 5	. 18	5. 6 to 6. 0	Moderate	Low.
90 to 100	75 to 85	50 to 60	0. 8 to 2. 5	. 18	5. 1 to 5. 5	Moderate	Low to moderate.
95 to 100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	6. 1 to 6. 5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
90 to 100	70 to 80	45 to 60	2. 5 to 5	. 14	6. 1 to 7. 3	Moderate	Low.
100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	6. 1 to 6. 6	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0 2 to 0. 8	. 17	(1)	Moderate	Low.

TABLE 5.—*Estimated*

Soil name	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Darroch (Da, Ds)	1 to 3	0 to 12	Silt loam	ML	A-6
		12 to 30	Silty clay loam	CL	A-6
		30 to 36	Silt	ML	A-4
		36 to 52	Fine sand	SP-SM	A-3
Darroch (Dc)	1 to 3	0 to 12	Loam	ML	A-6
		12 to 35	Silty clay loam	CL	A-6
		35 to 48	Silty clay	CH	A-7
Edwards (Ed)	0 to 2	0 to 19	Muck	Pt	A-7
		19 to 50	Marl		
Eel (Em)	2 to 3	0 to 21	Loam	ML	A-4
		21 to 30	Fine sandy loam	SM	A-4
Foresman (Ff)	2 to 3	0 to 23	Fine sandy loam	SM	A-2
		23 to 35	Loamy fine sand	SM	A-2
		35 to 40	Light sandy clay loam	SC or CL	A-4
		40 to 47	Fine sandy loam to loamy fine sand	SM	A-2
		47 to 50	Silt and very fine sand	CL	A-6
Foresman (Fo)	2 to 3	0 to 18	Loam	ML	A-6
		18 to 36	Clay loam	CL	A-6
		36 to 44	Silt and fine sand	CL or ML	A-4
Fox (FsA)	4 to 6+	0 to 19	Sandy loam	SM	A-4
		19 to 35	Gravelly sandy clay loam to gravelly clay loam.	SC or CL	A-4
		35 to 42	Sand and gravel	SW	A-1
Gilford (Gf, Gm, Gv)	0 to 2	0 to 28	Fine sandy loam	SM or ML	A-4
		28 to 46	Gravelly sandy loam	SM	A-2
		46 to 66	Medium sand with fine gravel	SP-SM	A-2
Homer (Ho)	1 to 3	0 to 14	Sandy loam to loam	SM or ML	A-4
		14 to 36	Sandy clay loam to clay loam	CL	A-6
		36 to 43	Gravelly light clay loam	SC or CL	A-4
		43 to 60	Very coarse sand and fine gravel	SP-SM	A-2
Hoopeston (Hp)	1 to 3	0 to 23	Fine sandy loam	SM	A-4
		23 to 33	Light sandy clay loam	SC or CL	A-4
		33 to 50	Fine and very fine sand	SM	A-2
Maumee (Ma, Md, Me, Mf)	0 to 2	0 to 10	Fine sandy loam	SM	A-2
		10 to 28	Loamy fine sand	SM-SP	A-2
		28 to 50	Fine sand	SM-SP	A-3
Mermill (Mh, Mk)	0 to 2	0 to 13	Silt loam	ML or OL	A-6
		13 to 31	Silty clay loam	CL	A-6
		31 to 42	Silty clay	CH	A-7
Metea (MlA, MlB)	2 to 4	0 to 32	Loamy fine sand and fine sand	SM or SP	A-2
		32 to 44	Clay loam	CL	A-4
		44 to 50	Loam till	ML	A-4
Miami (MmA, MmB, MmB2, MmC2, MnA, MoC3).	3 to 4	0 to 18	Fine sandy loam to heavy loam	SM or ML	A-4
		18 to 36	Clay loam	CL	A-6
		36 to 42	Loam till	ML	A-4
Montgomery (Mp)	0 to 2	0 to 30	Silty clay	CH	A-7
		30 to 48	Silty clay	CH	A-7
Morocco (Mr)	1 to 3	0 to 8	Loamy fine sand	SM	A-2
		8 to 65	Sand	SP	A-3
Newton (Nf)	0 to 2	0 to 16	Loamy fine sand	SM	A-2
		16 to 54	Sand	SM-SP	A-3

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve— No. 10	No. 40	No. 200	Permeability	Available water capacity	Reaction	Frost action potential	Shrink-swell potential
			Inches per hour	*Inches per inch of soil*	*pH value*		
100	90 to 95	80 to 90	0. 8 to 2. 5	0. 23	5. 1 to 6. 5	High	Low.
100	95 to 100	85 to 90	0. 2 to 0. 8	. 19	6. 1 to 6. 5	Moderate	Moderate.
100	95 to 100	80 to 85	0. 8 to 2. 5	. 20	(1)	High	Low.
100	90 to 95	5 to 10	5 to 10	. 05	(1)	Low	Low.
95 to 100	85 to 90	65 to 75	0. 8 to 2. 5	. 19	5. 1 to 6. 5	Moderate	Low.
100	95 to 100	85 to 90	0. 2 to 0. 8	. 19	6. 1 to 6. 5	Moderate	Moderate.
100	100	95 to 100	0. 5 to 0. 2	. 18	(1)	Moderate	High.
----------	----------	----------	2. 5 to 5	. 25+	6. 6 to 7. 3	Low	Low.
----------	----------	----------	Variable	Variable	(1)	Low	Low.
95 to 100	85 to 95	70 to 80	0. 8 to 2. 5	. 18	[1] 6. 6 to 7. 3	Moderate	Moderate
90 to 100	85 to 90	45 to 50	2. 5 to 5	. 13	6. 6 to 7. 3	Moderate	Low.
100	95 to 99	30 to 35	2. 5 to 5	. 14	5. 1 to 6. 6	Moderate	Low.
100	95 to 99	15 to 20	5 to 10	. 07	5. 1 to 5. 5	Low	Low.
100	95 to 99	45 to 55	0. 8 to 2. 5	. 16	5. 1 to 5. 5	Moderate	Low to moderate.
100	95 to 99	25 to 35	2. 5 to 5	. 09	6. 1 to 6. 6	Moderate	Low.
100	96 to 100	80 to 85	0. 8 to 2. 5	. 12	(1)	Moderate	Low.
95 to 100	85 to 95	65 to 75	0. 8 to 2. 5	. 19	6. 1 to 6. 5	Moderate	Low.
100	95 to 100	75 to 85	0. 2 to 0. 8	. 18	6. 1 to 7. 3	Moderate	Moderate.
100	95 to 100	70 to 75	0. 8 to 2. 5	. 12	(1)	Moderate	Low.
95 to 100	75 to 80	35 to 45	2. 5 to 5	. 12	4. 5 to 6. 5	Moderate	Low.
75 to 80	55 to 65	45 to 55	0. 8 to 2. 5	. 17	5. 1 to 6. 0	Moderate	Moderate.
60 to 70	15 to 35	0 to 5	5 to 10	. 03	(1)	Low	Low.
95 to 100	90 to 95	45 to 55	2. 5 to 5	. 15	5. 1 to 6. 5	Moderate	Low.
75 to 85	55 to 65	25 to 35	5 to 10	. 10	5. 6 to 6. 0	Moderate	Low.
85 to 95	55 to 65	5 to 10	5 to 10	. 03	[3]6. 6 to 7. 3	Low	Low.
90 to 100	70 to 80	45 to 55	2. 5 to 5	. 15	6. 1 to 7. 3	Moderate	Low.
95 to 100	85 to 90	50 to 60	0. 2 to 0. 8	. 18	5. 1 to 5. 5	Moderate	Low to moderate.
75 to 80	65 to 75	45 to 55	0. 8 to 2. 5	. 16	6. 1 to 6. 5	Moderate	Moderate.
80 to 90	25 to 35	5 to 10	5 to 10	. 03	[4] 6. 6 to 7. 3	Low	Low.
100	95 to 99	35 to 45	2. 5 to 5	. 15	5. 6 to 6. 5	Moderate	Low.
100	95 to 99	45 to 55	0. 8 to 2. 5	. 16	6. 1 to 6. 5	Moderate	Low to moderate.
100	95 to 99	25 to 35	2. 5 to 5	. 06	[5] 6. 1 to 6. 5	Low	Low.
100	95 to 100	15 to 25	5 to 10	. 10	6. 6 to 7. 3	Low to moderate	Low.
100	95 to 100	5 to 15	5 to 10	. 07	6. 6 to 7. 3	Low	Low.
100	80 to 85	3 to 10	5 to 10	. 05	6. 6 to 7. 3	Low	Low.
100	95 to 100	80 to 90	0. 8 to 2. 5	. 23	5. 6 to 6. 5	Moderate	Low to moderate.
100	95 to 100	85 to 90	0. 2 to 0. 8	. 19	6. 1 to 7. 3	Moderate	Moderate.
100	100	95 to 100	<0. 05	. 18	6. 6 to 7. 3	Moderate	High.
95 to 100	80 to 85	3 to 15	5 to 10	. 07	5. 1 to 6. 5	Low	Low.
95 to 100	70 to 75	55 to 65	0. 2 to 0. 8	. 18	5. 1 to 5. 5	Moderate	Low to moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
90 to 100	70 to 80	45 to 60	0. 8 to 5	. 14	6. 1 to 6. 5	Moderate	Low.
95 to 100	85 to 95	60 to 70	0. 2 to 0. 8	. 18	5. 6 to 6. 5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0. 2 to 0. 8	. 17	(1)	Moderate	Low.
100	100	95 to 100	0. 05 to 0. 2	. 19	6. 6 to 7. 3	Moderate	High.
100	100	95 to 100	0. 05 to 0. 2	. 18	(1)	Moderate	High.
100	95 to 100	15 to 20	5 to 10	. 07	5. 6 to 6. 0	Low	Low.
100	95 to 100	0 to 5	5 to 10	. 05	5. 1 to 6. 0	Low	Low.
100	95 to 100	15 to 25	5 to 10	. 10	5. 1 to 5. 5	Low	Low.
100	80 to 85	3 to 10	5 to 10	. 05	5. 1 to 5. 5	Low	Low.

TABLE 5.—*Estimated*

Soil name	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Odell (Od, Oe)	1 to 3	0 to 14	Silt loam	ML	A-6
		14 to 26	Light clay loam to clay loam	CL	A-6
		26 to 40	Loam till	ML	A-4
Oshtemo (OfA, OfB, OmA, OmB)	4 to 6+	0 to 28	Fine sandy loam to loamy fine sand	SM	A-2
		28 to 58	Sandy loam to light sandy clay loam.	SM or CL	A-4
		58 to 74	Fine sand and silt	ML or CL	A-4
Oshtemo (OhA, OhB, OhC)	4 to 6+	0 to 41	Loamy sand	SM	A-2
		41 to 49	Gravelly sandy loam	SM	A-2
		49 to 58	Gravelly sandy loam to gravelly loamy sand.	SM	A-2
		58 to 65	Sand and gravel	SW-SM	A-1
Parr (PaB2)	3 to 4	0 to 17	Loam	ML	A-6
		17 to 33	Heavy loam to clay loam	CL	A-6
		33 to 42	Loam till	ML	A-4
Plainfield (PIA, PIB, PIC PIE)	4 to 6+	0 to 4	Fine sand	SP-SM	A-3
		4 to 60	Fine sand	SP	A-3
Rensselaer (Re, Rs)	0 to 2	0 to 12	Silt loam	ML or OL	A-6
		12 to 30	Silty clay loam to sandy clay loam.	CL	A-6
		30 to 60	Very fine sand and silt	ML or CL	A-4
Seward (SeB)	2 to 3	0 to 10	Loamy fine sand	SM	A-2
		10 to 30	Fine sand	SP-SM	A-3
		30 to 45	Silty clay to silty clay loam	CH	A-7
Sloan (So, Ss)	0 to 2	0 to 30	Silt loam	ML-OL	A-6
Stone Quarries (St) (Properties were not estimated).					
Strole (Su)	1 to 3	0 to 9	Silt loam	ML	A-6
		9 to 14	Light silty clay loam	CL or CH	A-7
		14 to 40	Silty clay	CH	A-7
Tawas (Ta)	0 to 2	0 to 21	Muck	Pt	A-7
		32 to 42	Medium and fine sands	SP-SM	A-3
Wallkill (Wa)	0 to 2	0 to 20	Silt loam	ML	A-4
		20 to 45	Muck	Pt	A-7
		45 to 50	Peat	Pt	A-7
Washtenaw (Wh)	0 to 2	0 to 22	Silt loam	ML	A-4
		22 to 33	Silty clay	CH	A-7
		33 to 65	Silty clay loam to light clay loam	CL or CH	A-6 or A-7
		65 to 70	Loam till	ML	A-4
Westland (Ws, Wt)	0 to 2	0 to 12	Silt loam	ML or OL	A-6
		12 to 32	Silty clay loam to light sandy clay loam.	CL	A-4 or A-6
		32 to 45	Sand with variable amounts of gravel.	SP-SM	A-2

[1] Calcareous.
[2] Neutral to calcareous.
[3] Neutral in upper part; calcareous in lower part.
[4] Calcareous at 55 inches.

properties of soils—Continued

Percentage passing sieve—			Permeability	Available water capacity	Reaction	Frost action potential	Shrink-swell potential
No. 10	No. 40	No. 200					
			Inches per hour	*Inches per inch of soil*	*pH value*		
95 to 100	85 to 95	70 to 80	0.8 to 2.5	0.23	6.1 to 7.3	Moderate to high	Low.
100	85 to 95	60 to 70	0.2 to 0.8	.18	5.6 to 6.5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0.2 to 0.8	.17	([1])	Moderate	Low.
95 to 100	90 to 95	25 to 35	5 to 10	.09	6.1 to 6.5	Low to moderate	Low.
95 to 100	90 to 95	45 to 55	2.5 to 5	.15	5.6 to 6.0	Moderate	Low to moderate.
100	95 to 100	50 to 65	0.8 to 2.5	.12	5.6 to 7.3	Moderate	Low.
95 to 100	85 to 90	15 to 20	5 to 10	.07	5.6 to 7.3	Low	Low.
70 to 75	55 to 60	20 to 25	2.5 to 5	.10	5.6 to 6.0	Moderate	Low.
60 to 70	45 to 50	15 to 20	5 to 10	.08	6.6 to 7.3	Low to moderate	Low.
60 to 70	30 to 40	5 to 10	5 to 10	.03	([1])	Low	Low.
90 to 100	90 to 100	65 to 75	0.8 to 2.5	.18	5.1 to 5.5	Moderate	Low.
95 to 100	85 to 95	60 to 70	0.2 to 0.8	.18	5.6 to 6.5	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0.2 to 0.8	.17	([1])	Moderate	Low.
100	95 to 100	5 to 10	5 to 10	.07	4.5 to 5.0	Low	Low.
100	95 to 100	2 to 5	5 to 10	.05	4.5 to 5.0	Low	Low.
95 to 100	95 to 100	70 to 80	0.8 to 2.5	.23	6.1 to 6.5	Moderate to high	Low to moderate.
95 to 100	95 to 100	50 to 85	0.2 to 0.8	.19	6.1 to 7.3	Moderate	Moderate.
95 to 100	95 to 100	80 to 85	0.8 to 2.5	.12	([1])	Moderate	Low.
100	80 to 85	15 to 20	5 to 10	.07	6.1 to 6.5	Low	Low.
100	80 to 85	5 to 10	5 to 10	.05	5.6 to 6.0	Low	Low.
95 to 100	95 to 100	85 to 95	0.05 to 0.2	.18	[6] 6.1 to 6.5	Moderate	High.
95 to 100	85 to 95	70 to 80	0.8 to 2.5	.23	([1])	Moderate to high	Low to moderate.
----------	----------	----------	----------	----------	----------	----------	
100	95 to 100	80 to 90	0.8 to 2.5	.23	6.6 to 7.3	Moderate to high	Low to moderate.
100	95 to 100	95 to 100	0.2 to 0.8	.19	6.1 to 7.3	Moderate	Moderate.
100	100	95 to 100	0.05 to 0.2	.18	([1])	Moderate	High.
----------	----------	----------	2.5 to 5	.25+	6.6 to 7.3	Low	Low.
100	80 to 85	5 to 10	5 to 10	.04	[7] 7.4 to 7.8	Low	Low.
100	95 to 100	80 to 90	0.8 to 2.5	.23	5.1 to 6.0	Moderate to high	Low to moderate.
----------	----------	----------	2.5 to 5	.25+	5.6 to 6.0	Low	Low.
----------	----------	----------	2.5 to 5	.25+	7.4 to 7.8	Low	Low.
100	95 to 100	80 to 90	0.8 to 2.5	.23	6.6 to 7.3	Moderate to high	Low to moderate.
95 to 100	95 to 100	80 to 90	0.05 to 0.2	.18	6.6 to 7.3	Moderate	Moderate.
95 to 100	85 to 95	75 to 85	0.2 to 0.8	.18	6.6 to 7.3	Moderate	Moderate.
95 to 100	65 to 70	55 to 65	0.2 to 0.8	.17	([1])	Moderate	Low.
95 to 100	95 to 100	70 to 80	0.8 to 2.5	.23	6.6 to 7.3	Moderate to high	Low to moderate.
95 to 100	80 to 90	50 to 80	0.2 to 0.8	.19	6.1 to 7.3	Moderate	Moderate.
85 to 95	75 to 85	5 to 10	5 to 10	.03	[8] 7.4 to 7.8	Low	Low.

[5] Calcareous at 38 inches.
[6] Calcareous at 40 inches.
[7] Calcareous at 32 inches.
[8] Calcareous at 39 inches.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir areas
Abscota (Ab)	Fair	Unsuitable	Fair	Subject to flooding	Rapidly permeable material.
Ade (AdB)	Poor	Good for sand; no gravel.	Fair	Poorly graded, round sand grains.	Rapidly permeable sand
Aubbeenaubbee (AuA)	Fair to poor	Unsuitable	Fair	Seasonal high water table	Rapid permeability in upper 30 inches; moderately slow permeability in subsoil and substratum; seasonal high water table.
Ayr (AyA)	Fair	Unsuitable	Fair	Loose sandy material hinders hauling; cuts and fills needed in many places.	Rapid permeability in upper 2 to 3 feet; moderately slow permeability in subsoil and substratum.
Berrien (BcA, BcB)	Poor	Good for sand; no gravel.	Fair	Poorly graded, round sand grains; good bearing capacity; subject to wind erosion; loose sand is easily excavated but may hinder hauling.	Rapidly permeable material.
Blount (BaA)	Good to a depth of 10 inches.	Unsuitable	Poor	Seasonal high water table; plastic subsoil and substratum.	Slowly permeable subsoil; moderately slowly permeable substratum.
Brady (Bd, Bf)	Fair	Good for sand; poor for gravel.	Good	Seasonal high water table; rapidly permeable substratum.	Rapidly permeable substratum; may be suitable for pit ponds in areas of high water table.
Bronson (BgA, BmA)	Poor	Good for sand; poor for gravel.	Good	Good bearing capacity in substratum; good source of material for subbase or fill.	Rapidly permeable substratum.

features that affect engineering

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds—Con.		Agricultural drainage	Irrigation	Grassed waterways	
Embankment					
Rapidly permeable material.		Generally not needed	Soil features favorable; frequent flooding is a hazard.	Generally not needed; soil features favorable if needed.	Severe; subject to flooding.
Rapidly permeable sand		Not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed	Slight.
Subsoil: Fair to good stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Poor stability and compaction; moderate permeability when compacted; poor resistance to piping.		Seasonal high water table.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.
Subsoil: Fair to good stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Poor stability and compaction; moderate to slow permeability when compacted; poor resistance to piping.		Not needed	Soil features favorable	Generally not needed; soil features favorable if needed.	Moderate; upper range of moderately slow permeability.
Rapidly permeable material.		Not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed; soil highly erodible; special construction methods needed.	Slight.
Slowly permeable subsoil; moderately slowly permeable substratum.		Slow permeability; soil needs tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table; slow permeability.
Rapidly permeable substratum.		Seasonal high water table; moderately rapid permeability; sandy substratum; special blinding of tile necessary.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Moderate; seasonal high water table.
Rapidly permeable substratum.		Generally not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed; soil features favorable if needed.	Slight.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir areas
Brookston (Bn, Bo, Br, Bs)	Fair to good to a depth of 14 inches.	Unsuitable	Poor	High water table; plastic subsoil.	Moderately slowly permeable subsoil; high water table.
Carlisle (Ca)	Good to a depth of 18 inches.	Unsuitable	Unsuitable	High water table; unstable organic material.	Moderately rapidly permeable muck and peat; may be suitable for pit ponds in areas of high water table.
Celina (CbA, CbB2, CeA, CeB2).	Fair to good	Unsuitable	Fair	Cuts and fills needed in many places; fair to poor bearing capacity; subject to frost heave.	Moderately slowly permeable subsoil and substratum.
Chelsea (ChA, ChB, ChC, ChD).	Unsuitable	Good for sand; no gravel.	Fair	Poorly graded, round sand grains; cuts and fills needed in many places; loose sandy material hinders hauling.	Rapidly permeable sand
Clay pits (Cl) No interpretations made for purposes listed.					
Conover (CmA. CnA)	Good to a depth of 12 inches.	Unsuitable	Fair	Seasonal high water table; plastic subsoil.	Moderately slowly permeable subsoil and substratum.
Corwin (CoA, CrA, CrB2).	Good to a depth of 12 inches.	Unsuitable	Fair	Cuts and fills needed in some places; fair to poor bearing capacity; subject to frost heave.	Moderately slowly permeable subsoil and substratum.
Crosby (CsA, CtA, CuA, CuB).	Fair	Unsuitable	Fair	Seasonal high water table; plastic subsoil.	Moderately slowly permeable subsoil and substratum.
Darroch: (Da, Ds)	Good to a depth of 12 inches.	Poor or unsuitable for sand; 3 feet of overburden over silt and fine sand; no gravel.	Fair	Seasonal high water table; moderate amount of silt below a depth of 3 feet.	Moderately permeable material at a depth below 3 feet; may be suitable for pit ponds in areas of high water table.

features that affect engineering—Continued

Soil features affecting—Continued				Limitations for septic tank systems
Farm ponds—Con.	Agricultural drainage	Irrigation	Grassed waterways	
Embankment				
Subsoil: Fair to good stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Poor stability and compaction; moderate to slow permeability when compacted; poor resistance to piping.	High water table; moderately slow permeability; depressional.	Generally not needed	Soil features favorable	Severe; high water table.
Organic material	High water table; inadequate outlets in some areas; rapid subsidence.	Soil features favorable for subirrigation.	Soil features favorable	Severe; high water table; organic soil.
Moderately slowly permeable subsoil and substratum.	Generally not needed	Soil features favorable except for short slopes in some areas.	Soil features favorable	Moderate; upper limit of moderately slow permeability, in subsoil and substratum.
Rapidly permeable sand	Not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed; soil highly erodible; special construction methods needed.	Slight.
Moderately slowly permeable subsoil and substratum.	Seasonal high water table; moderately slow permeability; soils favorable for tile and need tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.
Moderately slowly permeable subsoil and substratum.	Generally not needed	Soil features favorable except for short slopes in some areas.	Soil features favorable	Moderate; upper limit of moderately slow permeability in subsoil and substratum.
Moderately slowly permeable subsoil and substratum.	High water table; moderately slow permeability; soils favorable for tile and need tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.
Rapidly permeable silt and fine sand below a depth of 3 feet.	High water table; moderately slow permeability; soils favorable for tile and need tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir areas
(Dc)	Good to a depth of 12 inches.	Unsuitable	Unsuitable	Highly plastic material at a depth of 3 feet.	Slowly permeable material below a depth of 3 feet; suitable for pit ponds in areas of high water table.
Edwards (Ed)	Good to a depth of 12 inches.	Unsuitable; potential source of marl.	Unsuitable	High water table; unstable organic material and marl.	Moderately permeable muck; variable permeability in marl; may be suitable for pit ponds in areas of high water table.
Eel (Em)	Good to a depth of 20 inches.	Unsuitable	Fair	Subject to flooding	Moderately permeable material.
Foresman:					
(Ff)	Fair	Fair for sand; may have minor amount of silt in substratum; no gravel.	Fair	May have a minor amount of silt in substratum.	Moderately permeable material.
(Fo)	Good to a depth of 12 inches.	Poor or unsuitable; 3 feet of overburden over silt and fine sand; no gravel.	Fair	Moderate amount of silt below a depth of 3 feet; fair bearing capacity; fair to good stability; subject to frost heave; good bearing capacity in substratum; fair shear strength; low volume change.	Moderately permeable material below a depth of 3 feet.
Fox (FsA)	Fair	Good; 2½ feet of overburden over sand and gravel.	Good	Well-drained, loose underlying sand and gravel is easily excavated but sometimes hinders hauling.	Moderately permeable subsoil; rapidly permeable underlying material.
Gilford (Gf, Gm, Gv)	Fair	Good for sand; poor for gravel.	Fair	High water table; rapidly permeable material.	Rapidly permeable material; may be suitable for pit ponds in areas of high water table.
Homer (Ho)	Fair	Good; 3 feet of overburden over sand and gravel.	Subsoil fair; underlying material good.	Seasonal high water table.	Rapidly permeable substratum.

features that affect engineering—Continued

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds—Con.	Agricultural drainage	Irrigation	Grassed waterways		
Embankment					
Slowly permeable material below a depth of 3 feet.	Slowly permeable clay in lower part of subsoil; soil needs complete surface drainage system supplemented by tile.	Generally not needed	Soil features favorable		Severe; seasonal high water table; permeability slow below a depth of 3 feet.
Muck and marl	Organic material subsides rapidly when drained; marl at a depth of 12 to 24 inches; high water table; inadequate outlets in some places; soil needs open ditch drainage.	Generally not needed	Soil features favorable		Severe; high water table.
Moderately permeable material.	Tile generally not needed	Soil features favorable; frequent flooding is a hazard.	Soil features favorable		Severe; subject to flooding.
Moderately permeable material.	Generally not needed	Soil features generally favorable; rapid intake; frequent applications required.	Soil features favorable		Moderate; moderately well drained.
Moderately permeable material below a depth of 3 feet; moderate amount of silt.	Tile generally not needed.	Soil features favorable; a good system of drainage should be installed and maintained.	Soil features favorable		Moderate; upper range of moderately slow permeability in subsoil; moderately well drained.
Rapidly permeable sand and gravel in substratum.	Not needed	Low water-holding capacity; rapid intake; some slopes of 6 to 12 percent.	Generally not needed; soil features favorable if needed.		Slight.
Rapidly permeable material below a depth of about 28 inches.	High water table; moderately rapidly permeable material above a depth of 28 inches; rapidly permeable material below 28 inches; sandy substratum; soils need open ditch drainage supplemented by tile.	Soil features favorable for subirrigation.	Soil features favorable		Severe; high water table.
Rapidly permeable substratum.	High water table; sandy and gravelly substratum; soil needs tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable		Moderate; seasonal high water table.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds
					Reservoir areas
Hoopeston (Hp)	Fair	Fair for sand; may have some silt in substratum; poor for gravel.	Fair	Seasonal high water table; rapidly permeable material.	Moderately rapid material in substratum.
Maumee (Ma, Md, Me, Mf).	Fair	Good for sand; poor for gravel.	Fair	High water table; rapidly permeable material.	Rapidly permeable sand; may be suitable for pit ponds in areas of high water table.
Mermill (Mh, Mk)	Good	Unsuitable	Subsoil poor; substratum very poor.	High water table; plastic material.	High water table; slow seepage.
Metea (MlA, MlB)	Fair to poor	Unsuitable	Fair	Cuts and fills needed in many places; fair to poor bearing capacity.	Upper 2 to 3 feet rapidly permeable; moderately slowly permeable subsoil and substratum.
Miami (MmA, MmB, MmB2, MmC2, MnA, MoC3).	Fair	Unsuitable	Fair	Cuts and fills needed in many places; fair to poor bearing capacity; subject to frost heave.	Moderately slowly permeable subsoil and substratum.
Montgomery (Mp)	Poor	Unsuitable; potential source of clay material.	Unsuitable	High water table; highly plastic material.	Slowly permeable material.
Morocco (Mr)	Poor	Good for sand; no gravel.	Fair	Seasonal high water table; rapidly permeable material.	Rapidly permeable material.
Newton (Nf)	Fair	Good for sand; poor for gravel.	Fair	High water table; rapidly permeable material.	Rapidly permeable sand; may be suitable for pit ponds in areas of high water table.
Odell (Od, Oe)	Good to a depth of 12 inches.	Unsuitable	Fair	Seasonal high water table; plastic subsoil.	Moderately slowly permeable subsoil and substratum.

features that affect engineering—Continued

Soil features affecting—Continued				Limitations for septic tank systems
Farm ponds—Con.	Agricultural drainage	Irrigation	Grassed waterways	
Embankment				
Moderately rapid material in substratum.	Seasonal high water table; sandy solum and substratum.	Soil features favorable; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.
Rapidly permeable material.	High water table; sandy solum; loose sand in substratum; soils need open ditch drainage supplemented by tile.	Soil features favorable for subirrigation.	Soil features favorable	Severe; high water table.
Slow permeability when compacted; good resistance to piping. Subsoil: Fair to good stability and compaction. Substratum: Fair to poor stability and compaction.	High water table; slow permeability.	Generally not needed	Generally not needed	Severe; high water table; slow permeability.
Subsoil: Fair to good stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Poor stability and compaction; moderate to slow permeability when compacted; poor resistance to piping.	Not needed	Soil features favorable, except for short slopes in some areas.	Soil features favorable	Moderate; upper range of moderately slow permeability in substratum.
Moderately slowly permeable subsoil and substratum.	Not needed	Soil features favorable, except for short slopes in some areas.	Soil features favorable	Moderate; upper range of moderately slow permeability in subsoil and substratum.
Slowly permeable material.	Slowly permeable material; soil needs complete surface drainage system supplemented by tile.	Generally not needed	Soil features favorable	Severe; high water table; slow permeability.
Rapidly permeable material.	Seasonal high water table; loose sand in solum and substratum.	Soil features favorable for sprinkler or surface irrigation; rapid intake; frequent applications required.	Soil features favorable	Moderate; seasonal high water table.
Rapidly permeable material.	High water table; very sandy substratum, unstable for ditchbanks; soil needs open ditch drainage supplemented by tile.	Soil suitable for subirrigation.	Soil features favorable	Severe; high water table.
Moderately slowly permeable subsoil and substratum.	Moderately slow permeability; soil favorable for tile and needs tile supplemented by surface drainage.	May be required for specialized cropping; a good system of drainage should be installed and maintained.	Soil features favorable	Severe; seasonal high water table.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds — Reservoir areas
Oshtemo (OfA, OfB, OhA, OhB, OhC, OmA, OmB).	Fair or poor	Good for sand; poor for gravel.	Good	Cuts and fills needed in many places; good bearing capacity in substratum; good source of material for subbase and fill.	Rapidly permeable substratum.
Parr (PaB2)	Good to a depth of 12 inches.	Unsuitable	Fair	Cuts and fills needed in many places; fair to poor bearing capacity; subject to frost heave.	Moderately slowly permeable subsoil and substratum.
Plainfield (PlA, PlB, PlC, PlE).	Unsuitable	Good for sand; no gravel.	Fair	Poorly graded, round sand grains; cuts and fills needed in many places; loose sand is easily excavated but sometimes hinders hauling; good bearing capacity; subject to wind erosion.	Rapidly permeable material.
Rensselaer (Re, Rs)	Good to a depth of 12 inches.	Poor to unsuitable; 3 feet of overburden over fine sand and silt; no gravel.	Poor	High water table; moderate amount of silt below a depth of 3 feet.	High water table; moderately permeable substratum.
Seward (SeB)	Poor	Unsuitable	Fair	Highly plastic substratum.	Upper 2 to 3 feet rapidly permeable; underlying material slowly permeable.
Sloan (So, Ss)	Good to a depth of 30 inches.	Unsuitable	Poor	Subject to flooding; high water table; poor bearing capacity; subject to frost heave.	Moderately permeable; may be suited for pit ponds where protected from flooding.
Stone Quarries (St). No interpretations made for purposes listed.					
Strole (Su)	Good to a depth of 14 inches.	Unsuitable; potential source of clay material.	Unsuitable	Seasonal high water table; highly plastic subsoil and substratum.	Slowly permeable material.
Tawas (Ta)	Good to a depth of 12 inches.	Good for sand; 2 to 3 feet of muck over sand; no gravel.	Surface layer unsuitable; substratum fair.	High water table; unstable organic material.	Underlying sand rapidly permeable; may be suitable for pit ponds in areas of high water table.

features that affect engineering—Continued

Soil features affecting—Continued				Limitations for septic tank systems
Farm ponds—Con.: Embankment	Agricultural drainage	Irrigation	Grassed waterways	
Rapidly permeable material.	Not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed; soil highly erodible; special construction methods needed.	Slight.
Moderately slowly permeable subsoil and substratum.	Not needed	Soil features favorable except for short slopes in some areas.	Soil features favorable	Moderate; upper limit of moderately slow permeability in subsoil and substratum.
Rapidly permeable material.	Not needed	Low water-holding capacity; rapid intake; frequent applications required.	Generally not needed; soil highly erodible; special construction methods needed.	Slight.
Subsoil and substratum: Fair stability and compaction; moderate to slow permeability when compacted; poor to good resistance to piping.	High water table; moderately slow permeability; depressional; stratified sand and silt below a depth of 4 feet.	Generally not needed	Soil features favorable	Severe; high water table.
Upper 2 to 3 feet rapidly permeable; underlying material slowly permeable.	Rapidly permeable loose sand; slowly permeable clay; soil needs surface drainage supplemented by random tile.	Soil features generally not favorable; slowly permeable substratum.	Soil erodible; special construction methods needed.	Severe; slow permeability.
Moderately permeable silt and very fine sand.	High water table; subject to flooding and ponding; inadequate outlets; soils need tile supplemented by surface drainage.	Generally not needed; frequent flooding may be a hazard.	Soil features favorable	Severe; subject to flooding.
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Slowly permeable material.	Seasonal high water table; slowly permeable material; soil needs complete surface drainage system supplemented by tile.	Generally not needed	Soil features favorable	Severe; seasonal high water table; slow permeability.
Rapidly permeable underlying sand.	High water table; inadequate outlets in some areas; organic material subsides when drained; less than 42 inches of muck over sand.	Soil features favorable for subirrigation.	Soil features favorable	Severe; high water table.

TABLE 6.—*Interpretations of soil*

Soil series and map symbol	Suitability as a source of—			Soil features affecting—	
	Topsoil	Sand and gravel	Highway subgrade material	Highway location	Farm ponds: Reservoir areas
Wallkill (Wa)	Good to a depth of 20 inches.	Unsuitable	Surface layer poor; substratum unsuitable.	High water table; unstable organic material in substratum.	Organic material; moderately rapid permeability below a depth of about 20 inches; may be suitable for pit ponds in areas of high water table.
Washtenaw (Wh)	Good to a depth of 18 inches.	Unsuitable	Poor	High water table; fair to poor bearing capacity; subject to frost heave.	High water table; moderately slow permeability in substratum; investigate underlying material thoroughly.
Westland, moderately deep (Ws, Wt).	Good to a depth of 12 inches.	Good; 3 feet of overburden over sand and gravel.	Subsoil poor; underlying material good.	High water table; plastic subsoil.	Rapidly permeable substratum areas; with high water table may be suitable for pit ponds.

Estimates of soil properties

Table 5 presents estimates of the properties of the soils that are significant in engineering. These estimates are given for a typical profile of each soil series. They are based on the test data in table 4 and on experience gained from working with and observing similar soils in other areas. The estimates apply, in general, to a depth of 5 feet or less. Some of the terms in this table are explained here; others are defined in the Glossary.

Frost action potential.—Frost action refers to the change that occurs in a soil as a result of alternate freezing and thawing. When the soil freezes, ice lenses form in it and heaving occurs. When the ice melts, the soil loses strength and stability as a result of the excess moisture. Soils that contain a large percentage of clay generally hold a large amount of water and, thus, are susceptible to frost action.

Shrink-swell potential.—This is the quality of a soil that determines the extent to which it will change in volume as the change in moisture content occurs. Clayey soils swell as the moisture content increases and shrink as the moisture decreases.

Interpretations of soil properties

Table 6 gives interpretations of the suitability of the soils for specific engineering uses. These interpretations apply to the representative profile of each soil series, as described in the section "Formation, Classification, and Morphology of Soils." Some of the column headings and ratings of suitability are explained here.

Topsoil.—In engineering work, topsoil is used on roadbanks or other areas that are to be seeded to grass or to some other vegetative cover. The ratings are based on texture, as follows: loamy fine sand—*poor;* fine sandy loam and silty clay loam—*fair;* loam and silt loam—*good.*

Highway subgrade material.—The suitability of the soil depends upon its performance when used as borrow for subgrade. Both the subsoil and the substratum are rated if they have different characteristics. The ratings are as follows: *good* for sand or gravel that contains some light sandy loam; *fair* for sand or loamy sand that contains a small amount of gravel or loam and clay loam; *poor* for heavy clay loam or silty clay loam that contains a small amount of gravel; and *unsuitable* for silt, clay, or organic material.

Highway location.—The entire soil profile is evaluated. The ratings are for undisturbed soil without artificial drainage. Significant factors include hazard of flooding, seasonal water table, and topography.

Farm pond reservoir areas.—Permeability, which affects seepage, is the main characteristic considered.

Farm pond embankments.—The characteristics considered are those that affect the use of disturbed soil

features that affect engineering—Continued

Soil features affecting—Continued				Limitations for septic tank systems
Farm ponds—Con. Embankment	Agricultural drainage	Irrigation	Grassed waterways	
Muck and peat below a depth of about 20 inches.	High water table; organic material below a depth of 2 feet; material unstable and subsides when drained; soil needs open ditch and tile drainage.	Generally not needed	Soil features favorable	Severe; high water table.
Subsoil: Fair stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Poor stability and compaction; moderate to slow permeability when compacted; poor resistance to piping.	High water table; slow permeability; soil needs tile drainage supplemented by surface drainage.	Generally not needed	Soil features favorable	Severe; high water table; slow permeability.
Subsoil: Fair to good stability and compaction; slow permeability when compacted; good resistance to piping. Substratum: Moderate permeability when compacted; poor resistance to piping.	High water table; moderately slow permeability; loose gravel and sand within a depth of 40 inches; soil needs open ditch drainage supplemented by tile.	Generally not needed	Soil features favorable	Severe; high water table.

material for construction of embankments to impound water. Some of the characteristics are permeability, stability, and susceptibility to piping.

Agricultural drainage.—Texture, permeability, topography, seasonal water table, and restricting layers are considered in rating soils for this purpose.

Irrigation.—Ratings are based on available moisture capacity and permeability and on such factors as slope, drainage, and hazard of flooding.

Grassed waterways.—Suitability depends on soil features that affect the establishment and growth of vegetation and the construction and maintenance of the waterways.

Septic tank disposal fields.—Factors evaluated are permeability, seasonal water table, hazard of flooding, and topography.

Formation, Classification, and Morphology of Soils

In this section the factors of soil formation are discussed, the soils are classified in categories above the series level, and the morphology of each soil series is described.

Soil Forming Factors

Five major factors influence the formation of soil (*8*). They are climate, living organisms, parent material, topography, and time. The nature and characteristics of any given soil are dependent upon the combined influence of these factors.

Climate and living organisms are the active forces that form soil. Their action changes the accumulated material into distinguishable layers, or horizons. The composition of the parent material determines the kind of soil that can be formed. Topography, or relief, influences the effect of temperature and moisture. The length of time a soil has been developing is reflected in the depth of the soil and in differences in the layers of the profile. The initial development of a soil generally is rapid, but a long time is needed for the full effect of weathering to produce distinct differences in layers of the soil profile.

Climate

Pulaski County has a temperate, humid, continental climate that is essentially uniform over the entire county. The mean annual precipitation is 36.7 inches. It is fairly well distributed throughout the year; only slightly greater amounts occur during the spring months. The monthly mean temperature is 51° F., and there are wide variations in temperature from summer to winter.

Climate influences the formation of soils in the county largely through moderately heavy amounts of precipitation. The rains and melting snow slowly seep downward through the soil. This percolating action causes physical and chemical changes. Physically, it removes the fine particles of the soil—the clay—from the surface layer to the subsoil. This accumulation of clay in the subsoil is characteristic of most soils in the county. Chemically, the percolating water dissolves minerals and moves them through the soil. As a result of this leaching, the free calcium carbonate has been removed from the surface layer and subsoil of most of the soils, and they are therefore medium acid to slightly acid in the surface layer.

The soils are frozen in the winter for 3 or 4 months. During this period the soil forming factors are largely dormant except for some freezing and thawing action.

Climate indirectly influences the formation of soil by stimulating the growth of living organisms, especially vegetation. The climate of Pulaski County is conducive to the growth of hardwood forest, which directly influences the formation of a group of soils classified as Gray-Brown Podzolic.

A more detailed account of the climate of Pulaski County is given in the section "General Nature of the County."

Living organisms

Small animals, micro-organisms, and plants are the living organisms that help to form soil. Earthworms, other small animals, and micro-organisms, such as bacteria and fungi, work on plant litter and convert it to humus, which stores moisture and plant nutrients and improves the structure and tilth of the soil.

Trees, grasses, and other plants are the principal forms of life that influence the formation of soils in Pulaski County. Every year they return large amounts of vegetative matter to the soil. Through their roots they bring moisture and nutrients from the lower part of the soil up into the plants and return much of the moisture and nutrients to the soil in the form of leaf and grass litter.

The native vegetation of the county consisted of prairie grass, deciduous hardwood forest, and water-loving grasses and sedges.

Prairie grass was predominant in the southwestern part of the county. The fibrous root system and leafy material added large amounts of organic matter to the soil each year, and the matter accumulated faster than it decomposed. As a result, soils that formed under prairie grass have thick, dark-colored layers of organic matter.

Deciduous hardwood forest was the native vegetation of the upland areas in the central and eastern parts of the county. Oak, hickory, and basswood commonly grew on the better drained areas, and elm, ash, and bur oak on the more poorly drained areas. In contrast to prairie grass, these forests returned small amounts of organic matter to the soil. The forest litter was only 1 to 3 inches thick, and it was very dark colored after decomposition. Areas in the county that have never been cultivated still have this thin layer of forest litter.

Wet, boggy areas were extensive in Rich Grove and Cass Townships, and some were scattered throughout the forests. The water-loving grasses and sedges that grew in these areas decomposed slowly, because wetness slowed the activity of the micro-organisms. Consequently, thick deposits of organic material, known as peat or muck, accumulated.

Parent material

In Pulaski County, differences among soils can be attributed mainly to the different kinds of parent material in which they formed. The four kinds of parent material in the county are glacial till, outwash material, organic matter, and alluvial material.

Glacial till is the nonassorted material that was deposited by a glacier. It is a mixture of pebbles, sand, and clay and a few large stones. The till is of Wisconsin age and is the parent material of about 26 percent of the soils in the county.

The area of till along the eastern border of the county is part of the Maxinkuckee moraine system. This till is mainly loam in texture. The Miami, Celina, Brookston, and Crosby soils formed in these deposits under deciduous forest. In many areas the till has been modified by a deposit of sand, one to several feet thick. The Metea, Chelsea, and Aubbeenaubbee soils formed in these areas.

A large area of glacial till in the southwestern part of the county also is mainly loam in texture, but the native vegetation was prairie grass (fig. 9). The Parr, Corwin, and Odell soils are examples of those that formed in this till.

A small area of clay loam or silty clay loam till is in the northwestern part of the county. It is part of the Marseilles moraine system and is the parent material of the Blount soils.

Outwash deposits consist of assorted materials that were deposited by rivers, streams, and lakes during the glacial period. These materials are mostly stratified sand and gravel, but they include lacustrine deposits of silt and clay. Outwash materials make up about 68 percent of the land area in the county.

Outwash deposits underlain by sand and gravel are on the terraces of the Tippecanoe River where the Oshtemo, Bronson, and Brady soils formed.

The many sand ridges throughout the county were formed by the action of wind on outwash material (fig. 10). The Chelsea, Plainfield, and Berrien soils formed in this material.

Large areas of outwash deposits, consisting of sand and a small amount of gravel, are in the depressions throughout the central and northern parts of the county. These deposits are the parent material of the Maumee, Gilford, and Newton soils.

An area of medium-textured and fine-textured outwash is north of Francesville. This area, once a lakebed, is composed mostly of silt and clay and small amounts of sand. The Rensselaer, Darroch, Montgomery, and Strole are examples of soils that formed in these deposits.

Organic deposits make up about 6 percent of the land area of the county. Large areas are in the northwestern part, and less extensive ones occur throughout the county. These areas were once the sites of shallow lakes. The reeds and sedges that grew in them decomposed so slowly that thick deposits of organic material gradually accumulated. The Carlisle soils formed in these deposits. The Tawas and Edwards soils formed in a thin deposit of organic material underlain by mineral material.

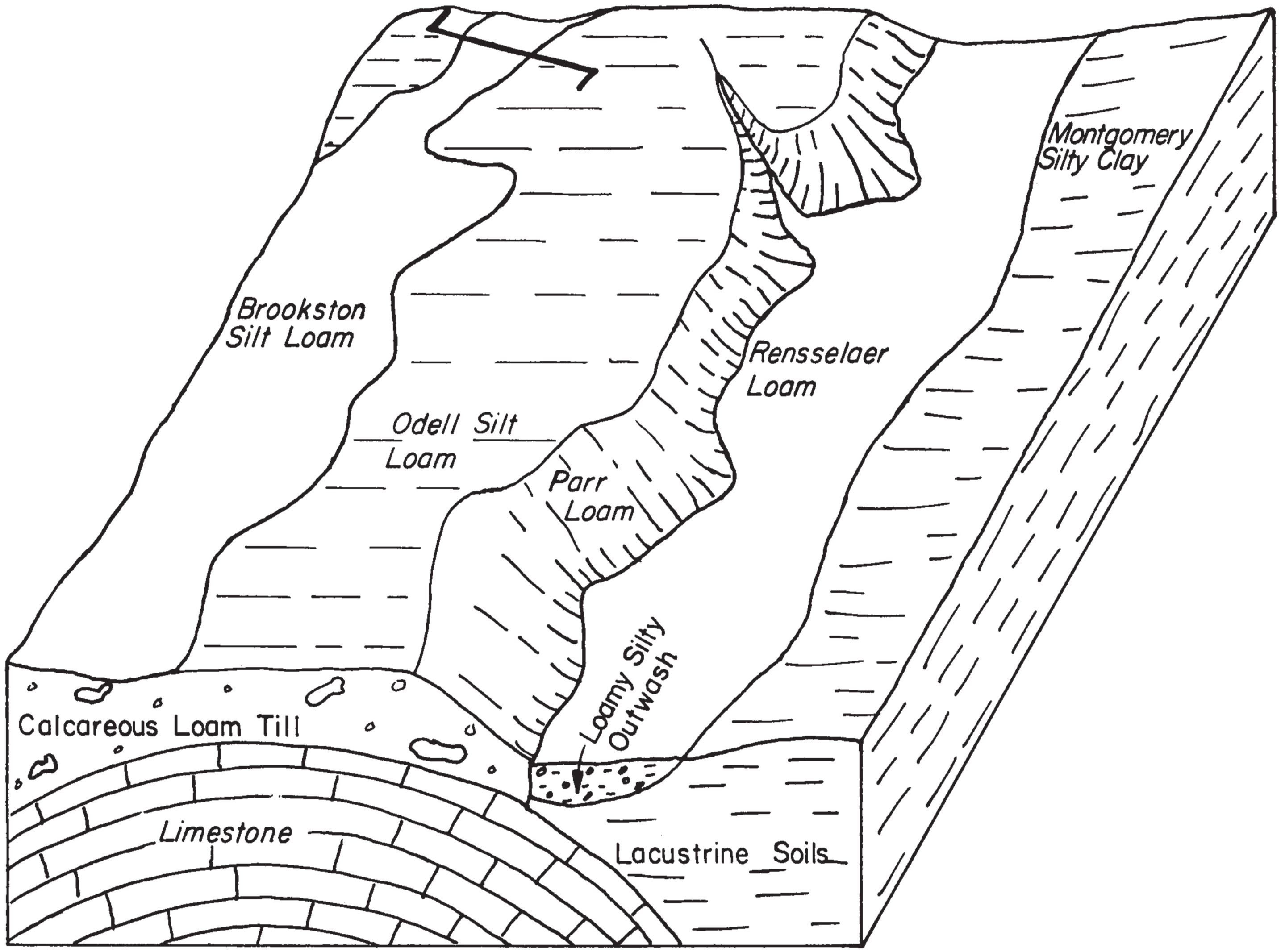

***Figure 9.*—Prairie soils that formed in loam till and adjoining soils that formed in outwash and lacustrine deposits.**

Alluvial material occupies less than 1 percent of the county land area. It is on bottom land along Mill Creek and the Tippecanoe River. Because of the frequent flooding and accumulation of new alluvium, soils that form in this material are relatively young. The Abscota, Eel, and Sloan soils are forming in alluvium.

Topography

Variations in the land surface influence the formation of soil by affecting the degree of drainage and erosion. Restricted internal drainage has been the most influential factor. A high water table has restricted the drainage of soils in depressions and in many of the nearly level areas. Intensive use of these soils is not possible unless the water table is lowered by the installation of open ditch and tile drainage systems.

The effect of drainage on the morphology of soil is evident when a comparison is made of soils that formed in similar parent material but under different drainage conditions. The Brookston soils formed in loam till in poorly drained depressions. They have a thick, very dark colored surface layer and a grayish subsoil mottled with yellowish brown. The Miami soils also formed in loam till, but on well-drained uplands. They have a light-colored surface layer and a yellowish-brown subsoil.

Surface drainage has had less effect on soil formation than internal drainage. Soils that formed in loam till in moderately sloping areas are not so strongly developed as those that are in nearly level areas, mainly because more of the surface water runs off the moderately sloping soils and less percolates through the soil profile. Consequently, the soil forming processes are slower.

Erosion has had a limited effect on soils in the county. Geological erosion has occurred at such a slow rate that soil formation has maintained pace with it. Accelerated erosion has occurred on only a small acreage in the county.

Time

Time determines, to a great extent, the age of a soil, or its degree of profile development. The influence of

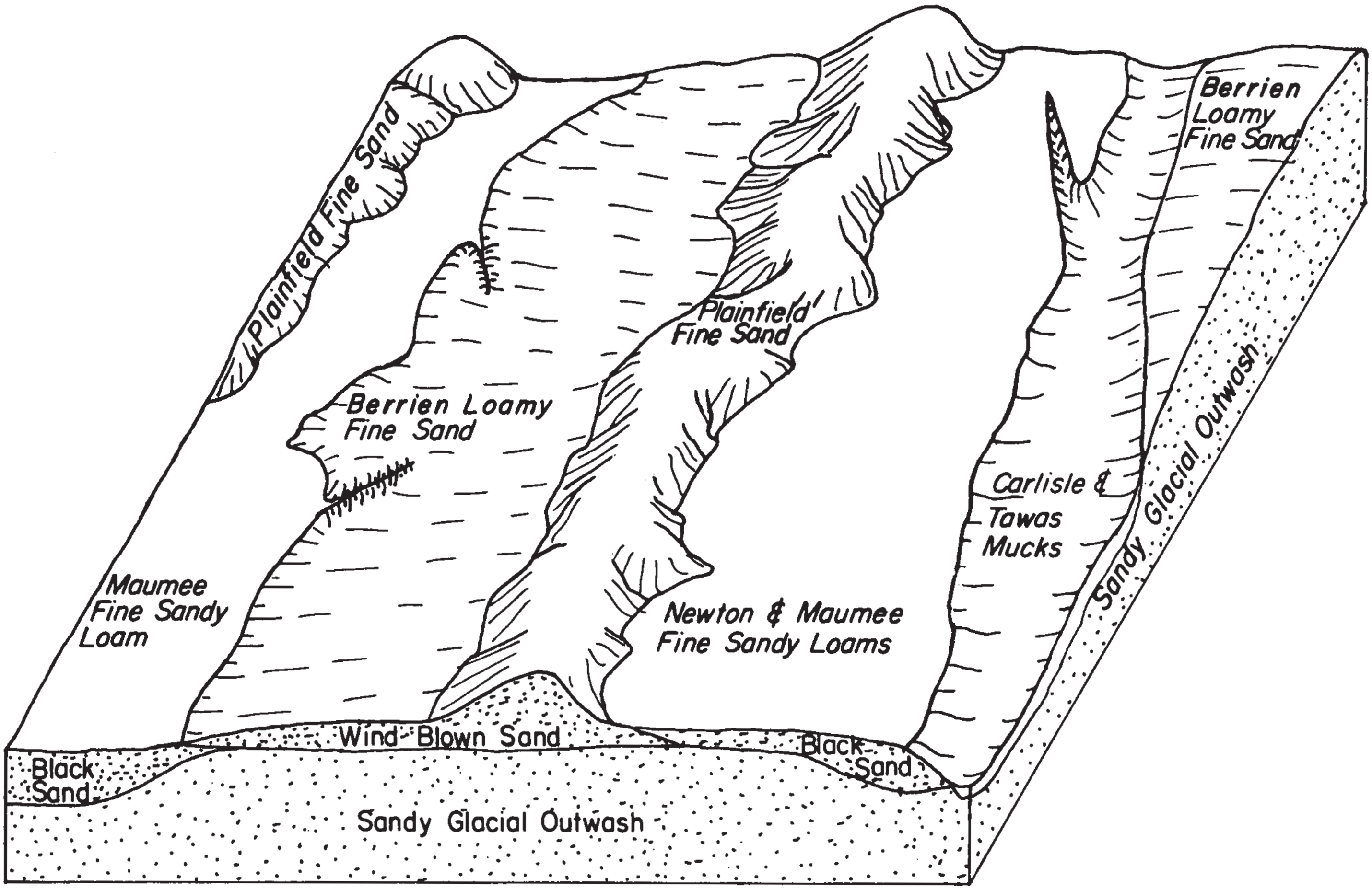

***Figure 10.*—Topographical relationships between the soils on sand ridges, in depressional outwash areas, and in organic deposits.**

time, however, may be modified by erosion, by the deposition of materials, by relief, and by the kind of parent material.

A mature soil has well-defined, genetically related horizons because the rate of soil formation has exceeded the rate of geologic erosion. The Miami soils are mature. An immature soil shows little or no horizon development. Soils on bottom land receive fresh deposits of alluvial material and have had little time for horizon development. The Eel soils, which are on the bottom land of the Tippecanoe River, are immature soils.

Classification of Soils

Soils are classified so that they can be readily identified and knowledge about them can be organized and applied to areas ranging in size from a city lot or a small farm to a country or a continent. Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and revised later (*11*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 and supplemented in March 1967. This system is under continuous study (*9, 12*). Therefore, readers interested in development of the system should refer to the latest publications available. In table 7 the soils of Pulaski County are classified according to the 1938 and the current systems.

In the 1938 system, the soils have been placed in six categories. Beginning with the most inclusive, these are the order, suborder, great soil group, family, series, and type. In the most inclusive category there are three orders, whereas in the narrowest category there are thousands of types. The suborder and family categories have never been fully developed in the 1938 system and thus have been little used. Attention has been given mostly to the classification of soils into series and types, and to the subsequent grouping of series into great soil groups and orders. Series that are alike in fundamental characteristics are classified as one great soil group. Many series do not fit the central, or modal, concept of any one great soil group. These series, called intergrades, have predominantly the characteristics of one great soil group and some characteristics of another.

Classes in the highest category of the 1938 classification system are the zonal, intrazonal, and azonal orders (*11*). The zonal order is made up of soils with evident, genetically related horizons that reflect the predominant influence of climate and living organisms. This order is represented in Pulaski County by the Gray-Brown Podzolic and the Brunizem great soil groups. The intrazonal order consists of soils that have evident, genetically related horizons reflecting the dominant influence of topography, parent material, or time. It is represented by Humic Gley soils and Bog soils. The azonal order consists of soils that lack distinct, genetically related horizons, generally because they are young or immature. This order is represented by Alluvial soils and Regosols.

Morphology of Soils

In this section the processes that affect soil morphology are explained and the morphology of a representative profile of each soil series is described.

Soil morphology in Pulaski County generally is expressed by a mature B horizon and by mature gleyed horizons. Most of the soils have prominent horizons within the solum. Exceptions to this are the Regosols, the Alluvial soils, and the Bog (organic) soils.

Horizon differentiation can be attributed mainly to one or more of the following processes: (1) accumulation of organic matter, (2) leaching of carbonates and soluble minerals, (3) translocation of silicate clay minerals, and (4) reduction and transfer of iron (gleying). In most of the soils, two or more of these processes were involved, as in the Brookston soils, which show the effects of all four processes.

Organic matter has accumulated in the surface layer to form an A1 horizon in most of the soils, but the quantity varies considerably. The Miami soils, which formed under timber, have a thin A1 horizon that is low in organic matter. The Parr soils, which formed under prairie grass, have a relatively thick A1 horizon that contains much organic matter. The Carlisle, Tawas, and Edwards soils are wet organic soils that have a muck horizon underlain by peat, marl, or sandy mineral material. The very poorly drained soils have a distinct and generally thick A1 horizon as a result of the accumulation of organic matter and the reduction and transfer of iron.

The leaching of carbonates and soluble minerals has occurred at a varying rate in most of the soils. For example, the Crosby soils have been leached of carbonates to a depth of 2½ to 3 feet. The Brookston soils, which formed in the same kind of material, have been leached of carbonates to a depth of 3½ to 5 feet.

The effects of leaching on horizon differentiation are indirect in that the leaching permits the subsequent translocation of silicate clay minerals in many of the soils. The leaching of iron, aluminum, manganese, and other soluble minerals from the surface layer has been important in differentiating the horizons of soils that formed under timber. In these soils a light-colored A2 horizon, low in clay content, has formed. This is characteristic of the Fox, the Oshtemo, and other Gray-Brown Podzolic soils in the county. On the other hand, leaching has had little effect on the removal of carbonates and soluble minerals from the sandy Plainfield soils and other Regosols and from the Sloan, Abscota, Eel, and other Alluvial soils, all of which have no distinct horizons.

The translocation of silicate clay minerals has affected all of the Gray-Brown Podzols and Brunizems and many of the Humic Gley soils. This movement of silicate clay from the A1 horizon to the B horizon is evident by the presence of clay films on many of the ped surfaces in the B horizon. These clay films are commonly darker colored than the ped interiors. There are also clay flows along the root channels and krotovinas in many of the Humic Gley soils. In general, a considerable amount of clay has been moved in the medium-textured and fine-textured soils, and a small but significant amount has been moved in the coarse-textured soils.

TABLE 7.—*Soil series classified according to the current and the 1938 systems of classification*

Soil series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Abscota	Sandy, siliceous, mesic	Entic Hapludoll	Mollisol	Alluvial	Azonal.
Ade	Sandy, siliceous, mesic	Psammentic Argiudoll	Mollisol	Brunizem	Zonal.
Aubbeenaubbee	Fine loamy, mixed, mesic	Aquic Hapludalf	Alfisol	Gray-Brown Podzolic intergrading to Low-Humic Gley.	Zonal.
Ayr	Fine loamy, mixed, mesic	Typic Argiudoll	Mollisol	Brunizem	Zonal.
Berrien	Sandy, siliceous, acid, mesic.	Aquic Udipsamment	Entisol	Regosol	Azonal.
Blount	Fine, mixed, mesic	Aeric Ochraqualf	Alfisol	Gray-Brown Podzolic intergrading to Low-Humic Gley.	Zonal.
Brady	Coarse loamy, siliceous, mesic.	Aquollic Hapludalf	Alfisol	Gray-Brown Podzolic intergrading to Low-Humic Gley.	Zonal.
Bronson [1]	Coarse loamy, siliceous, mesic.	Aquic Arenic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Brookston	Fine loamy, mixed, noncalcareous, mesic.	Typic Argiaquoll	Mollisol	Humic Gley	Intrazonal.
Carlisle	Organic	(2)	Histosol	Bog (organic)	Intrazonal.
Celina	Fine loamy, mixed, mesic	Aquic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Chelsea	Sandy, siliceous, mesic	Psammentic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Conover [3]	Fine loamy, mixed, mesic	Mollic Ochraqualf	Alfisol	Gray-Brown Podzolic intergrading to Brunizem.	Zonal.

See footnotes at end of table.

TABLE 7.—*Soil series classified according to the current and the 1938 systems of classification*—Continued

Soil series	Current classification			1938 classification	
	Family	Subgroup	Order	Great soil group	Order
Corwin	Fine loamy, mixed, mesic	Typic Argiudoll	Mollisol	Brunizem	Zonal.
Crosby	Fine loamy, mixed, mesic	Aeric Ochraqualf	Alfisol	Gray-Brown Podzolic intergrading to Low-Humic Gley.	Zonal.
Darroch	Fine loamy, mixed, mesic	Aquic Argiudoll	Mollisol	Brunizem intergrading to Humic Gley.	Zonal.
Edwards	Organic	(2)	Histosol	Bog (organic) soils	Intrazonal.
Eel	Fine loamy, mixed, mesic	Aquic Fluventic Eutrochrept.	Inceptisol	Alluvial	Azonal.
Foresman	Fine loamy over sandy or sandy skeletal, mixed, mesic.	Typic Argiudoll	Mollisol	Brunizem	Zonal.
Foresman, sandy	Coarse loamy, mixed, mesic.	Typic Argiudoll	Mollisol	Brunizem	Zonal.
Fox	Fine loamy over sandy or sandy skeletal, mixed, mesic.	Typic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Gilford	Coarse loamy, mixed, noncalcareous, mesic.	Typic Haplaquoll	Mollisol	Humic Gley	Intrazonal.
Homer	Fine loamy, mixed, mesic	Aeric Ochraqualf	Alfisol	Gray-Brown Podzolic intergrading to Low-Humic Gley.	Zonal.
Hoopeston	Coarse loamy, siliceous, mesic.	Aquic Hapludoll	Mollisol	Brunizem intergrading to Humic Gley.	Zonal.
Maumee	Sandy, siliceous, noncalcareous, mesic.	Typic Haplaquoll	Mollisol	Humic Gley	Intrazonal.
Mermill	Fine loamy, mixed, noncalcareous, mesic.	Typic Argiaquoll	Mollisol	Humic Gley	Intrazonal.
Metea	Sandy over loamy, siliceous over mixed, mesic.	Arenic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Miami	Fine loamy, mixed, mesic	Typic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Montgomery	Fine, mixed, noncalcareous, mesic.	Typic Haplaquoll	Mollisol	Humic Gley	Intrazonal.
Morocco	Sandy, siliceous, acid, mesic.	Aquic Udipsamment	Entisol	Regosol intergrading to Low-Humic Gley.	Azonal.
Newton	Sandy, siliceous, acid, mesic.	Typic Humaquept	Inceptisol	Humic Gley	Intrazonal.
Odell	Fine loamy, mixed, mesic	Aquic Argiudoll	Mollisol	Brunizem intergrading to Humic Gley.	Zonal.
Oshtemo [1]	Coarse loamy, siliceous, mesic.	Arenic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Parr	Fine loamy, mixed, mesic	Typic Argiudoll	Mollisol	Brunizem	Zonal.
Plainfield	Sandy, siliceous, acid, mesic.	Typic Udipsamment	Entisol	Regosol	Azonal.
Rensselaer	Fine loamy, mixed, noncalcareous, mesic.	Typic Argiaquoll	Mollisol	Humic Gley	Intrazonal.
Seward	Coarse loamy over fine, siliceous over illitic, mesic.	Arenic Hapludalf	Alfisol	Gray-Brown Podzolic	Zonal.
Sloan [4]	Fine loamy, mixed, calcareous, mesic.	Fluventic Haplaquoll	Mollisol	Humic Gley intergrading to Alluvial.	Intrazonal.
Strole	Fine, illitic, mesic	Aquic Argiudoll	Mollisol	Brunizem intergrading to Humic Gley.	Zonal.
Tawas	Organic	(2)	Histosol	Bog (organic)	Intrazonal.
Wallkill	Fine silty, mixed, mesic	Thapto-Histic Haplaquept [5]	Inceptisol	Alluvial	Azonal.
Washtenaw [6]	Fine loamy, mixed, nonacid, mesic.	Fluventic Haplaquept	Inceptisol	Alluvial	Azonal.
Westland	Fine loamy, mixed, noncalcareous, mesic.	Typic Argiaquoll	Mollisol	Humic Gley	Intrazonal.

[1] These soils in Pulaski County differ from those typical of the series, which is in the Typic Hapludalf subgroup and the coarse loamy, mixed, mesic family.
[2] Soils in the Histosol order have not yet been placed in subgroups.
[3] These soils in Pulaski County differ from those typical of the series, which is in the Aquollic Hapludalf subgroup.
[4] These soils in Pulaski County differ from those typical of the series, which is in the noncalcareous family.
[5] Tentative.
[6] These soils in Pulaski County differ from those typical of the series, which is tentatively in the Thapto-Aquollic Udifluvent subgroup.

The reduction and transfer of iron has occurred in all of the very poorly drained and somewhat poorly drained soils and to some extent in the lower horizons of the moderately well drained soils, such as the Bronson soils. Wetness has reduced the iron oxide to more soluble forms, as indicated by the gray colors of the horizons. Iron in this form is relatively mobile. It may move completely out of the soil profile or it may move only a short distance within the horizon of origin. Pulaski County has large areas of naturally wet soils, and the reduction and transfer of iron, a process commonly called gleying, has been important in horizon differentiation. The Montgomery and the Brookston soils reflect this process in the gleyed colors of their B horizon.

In the following subsection, the profile descriptions of the soil series show the comparative effects of the processes in horizon differentiation.

Descriptions of soil profiles

This section is for readers who need detailed information about the morphology of the soils. Unless otherwise stated, the colors described are for moist soils.

Each series description contains a comparison of the series described with one or more other series in the survey area that are either closely associated geographically or are morphologically similar.

Abscota Series

The Abscota series consists of well-drained soils forming in sandy sediments washed from Wisconsin age drift. These soils are slightly acid to mildly alkaline in the surface and subsurface horizons.

Abscota soils were derived from coarser textured materials than the moderately well drained Eel soils.

Profile of Abscota fine sandy loam in a cultivated field in NE¼NE¼ sec. 18, T. 29 N., R. 2 W.—

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) light fine sandy loam; weak, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A12—6 to 13 inches, very dark grayish-brown (10YR 3/2) light fine sandy loam; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

C—13 to 30 inches +, dark-brown (7.5YR 4/4) loamy fine sand; massive; very friable; color grades to a dark yellowish brown (10YR 4/4) at a depth of about 20 inches; neutral.

The texture of the Ap horizon is predominantly fine sandy loam, but the color ranges from very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2). Thin strata of loam and silt loam are in the C horizon in some areas. Glacial till occurs in a few places, and it is at a depth of 36 to 48 inches.

Ade Series

The Ade series consists of excessively drained, weakly developed soils that formed in very strongly acid to medium acid, sandy, glacial drift material reworked by wind. These soils formed under prairie grass.

Ade soils occur with Ayr soils, but differ from them in that Ayr soils formed in 18 to 40 inches of fine sandy loam over loam or light clay loam till. They differ from the Foresman soils, in that Foresman soils are moderately well drained, have a more strongly developed B horizon, and are underlain by stratified silt and fine sand.

Profile of Ade loamy fine sand in a cultivated field in NE¼NW¼ sec. 3, T. 29 N., R. 4 W.—

Ap—0 to 7 inches, very dark brown (10YR 2/2) loamy fine sand; weak, medium, granular structure; very friable; strongly acid; abrupt, smooth boundary.

A12—7 to 10 inches, very dark grayish-brown (10YR 3/2) and dark-brown (10YR 4/3) loamy fine sand; weak, medium, granular structure; very friable; strongly acid; clear, smooth boundary.

A3—10 to 29 inches, dark-brown (10YR 3/3) to brown (10YR 5/3) light loamy fine sand; weak, fine and medium, granular structure; very friable; medium acid; abrupt, wavy boundary.

Bt1—29 to 31 inches, dark-brown (10YR 3/3) to brown (10YR 5/3) heavy loamy fine sand; weak, fine and medium, subangular blocky structure; very friable; strongly acid; abrupt, irregular boundary.

A21—31 to 40 inches, brown (10YR 5/3) fine sand; single grain; loose; medium acid; abrupt, irregular boundary.

Bt2—40 to 47 inches, dark yellowish-brown (10YR 4/4) to dark-brown (7.5YR 4/4) heavy loamy fine sand; weak, fine and medium, subangular blocky structure; very friable; slightly acid; abrupt, irregular boundary.

A22—47 to 50 inches, pale-brown (10YR 6/3) fine sand; single grain; loose; slightly acid; abrupt, irregular boundary.

Bt3—50 to 52 inches, dark yellowish-brown (10YR 4/4) heavy loamy fine sand; weak, fine, subangular blocky structure; very friable; slightly acid; abrupt, irregular boundary.

C1—52 to 65 inches, pale-brown (10YR 6/3) fine sand; single grain; loose; slightly acid; gradual, wavy boundary.

C2—65 to 70 inches +, yellowish-brown (10YR 5/4) to light yellowish-brown (10YR 6/4) fine and very fine sand; single grain; loose; color grades to a very pale brown (10YR 7/3) below a depth of 70 inches; medium acid.

The texture of the Ap horizon is uniformly loamy fine sand, but the color ranges from very dark brown (10YR 2/2) to dark brown (10YR 3/3). The depth to the first textural or color band ranges from 24 to 55 inches. The bands range from ½ inch to 7 inches in thickness, but they commonly are 2 to 4 inches thick. Their texture is predominantly heavy loamy fine sand. These bands are discontinuous horizontally, but they occur for several feet throughout the depth of the profile. The Ade soils grade to the Ayr soils in areas where till occurs at a depth of 40 inches or less.

Aubbeenaubbee Series

The Aubbeenaubbee series consists of somewhat poorly drained soils that formed in 20 to 36 inches of loamy sand to sandy loam over material weathered from loam or light clay loam till. The depth to calcareous till ranges from 40 to 54 inches. These soils formed under deciduous forest.

Aubbeenaubbee soils are in the catena that includes the well-drained Metea soils. They occur with Crosby soils but differ from them in that Crosby soils formed in loam till. They differ from Morocco soils in that Morocco soils formed in deep, acid sand and lack a textural B horizon. They differ from Brady soils in that Brady soils are underlain by calcareous sand and gravel.

Profile of Aubbeenaubbee fine sandy loam in a meadow in NW¼SW¼ sec. 28, T. 30 N., R. 1 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) light fine sandy loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A21—8 to 19 inches, pale-brown (10YR 6/3) loamy sand; few, fine, faint, yellowish-brown (10YR 5/4) and grayish-brown (10YR 5/2) mottles; weak, fine, granular structure; very friable; few, very dark grayish-brown (10YR 3/2) organic fillings in root channels; medium acid; clear, wavy boundary.

B1—19 to 30 inches, mottled, very pale brown (10YR 7/4), grayish-brown (10YR 5/2), and yellowish-brown (10YR 5/8) loamy sand; weak, medium, granular structure; very friable; strongly acid; abrupt, wavy boundary.

IIB21—30 to 36 inches, mottled, pale-brown (10YR 6/3), gray (10YR 6/1), and strong-brown (7.5YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; firm; medium acid; clear, wavy boundary.

IIB22—36 to 46 inches, mottled, light brownish-gray (2.5Y 6/2) and strong-brown (7.5YR 5/8) clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on ped surfaces; slightly acid; clear, wavy boundary.

IIC—46 to 54 inches +, mottled, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/8) loam till; massive; friable; calcareous.

The texture of the Ap horizon is fine sandy loam or loamy fine sand, and the color is dark brown (10YR 3/3) to dark grayish brown (10YR 4/2). The total thickness of the A horizons ranges from 19 to 36 inches. The depth to mottling ranges from 8 to 15 inches. Where the thickness of the sandy overburden approaches 36 inches, the B2 horizon is relatively thin and ranges from 4 to 10 inches in thickness. The depth to calcareous loam till is 40 to 54 inches.

Ayr Series

The Ayr series consists of well-drained soils that formed in 20 to 36 inches of loamy sand to sandy loam over loam to light clay loam till. These soils formed under prairie grass vegetation.

Ayr soils occur with Ade soils but differ from them in that Ade soils formed in deep sand deposits.

Profile of Ayr fine sandy loam in a cultivated field in SW¼SE¼ sec. 10, T. 29 N., R. 4 W.—

Ap—0 to 8 inches, very dark gray (10YR 3/1) fine sandy loam; weak, medium, granular structure; very friable; strongly acid; abrupt, smooth boundary.

A12—8 to 20 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, medium, granular structure; very friable; very strongly acid; clear, smooth boundary.

A3—20 to 29 inches, yellowish-brown (10YR 5/4) loamy fine sand; weak, coarse, subangular blocky structure; very friable; many very dark grayish-brown (10YR 3/2) organic fillings in root channels; medium acid; abrupt, smooth boundary.

IIB2t—29 to 40 inches, brown (10YR 5/3) clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on ped surfaces; medium acid; clear, wavy boundary.

IIC—40 to 45 inches +, yellowish-brown (10YR 5/4) loam till; common, medium, distinct, pale-brown (10YR 6/3) mottles; massive; friable; calcareous.

The texture of the Ap horizon is uniformly fine sandy loam, but the color ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The thickness of the loamy material over till ranges from 20 to 36 inches but commonly is 24 to 30 inches. The texture of the B horizon is sandy clay loam to clay loam. The B horizon is correspondingly thinner in areas where the thickness of the loamy material approaches 36 inches. The texture of the till is predominantly loam.

Berrien Series

The Berrien series consists of moderately well drained soils that formed in strongly acid or very strongly acid sand under deciduous forest.

Berrien soils are in the catena that includes the excessively drained Plainfield, the somewhat poorly drained Morocco, and the dark-colored, very poorly drained Newton soils. Berrien soils differ from Seward soils in that Seward soils are underlain by fine-textured material at a depth of 18 to 42 inches. Berrien soils occur in close association with Chelsea soils but differ from them in that Chelsea soils are excessively drained and have thin, discontinuous textural horizons at a depth less than 60 inches.

Profile of Berrien loamy fine sand in a cultivated field in SE¼SW¼ sec. 6, T. 31 N., R. 2 W.—

Ap—0 to 9 inches, dark-brown (10YR 3/3) loamy fine sand, light brownish gray (10YR 6/2) when dry; weak, fine, granular structure; very friable; many fine roots; medium acid; abrupt, smooth boundary.

B—9 to 24 inches, yellowish-brown (10YR 5/8) fine sand; single grain; loose; color grades to yellowish brown (10YR 5/6) in lower part of horizon; strongly acid; clear, wavy boundary.

C1—24 to 32 inches, yellow (10YR 7/6) fine sand; common, medium, faint, brownish-yellow (10YR 6/8) and common, medium, distinct, light-gray (10YR 6/2) mottles; single grain; loose; strongly acid; clear, wavy boundary.

C2—32 to 60 inches +, mottled, very pale brown (10YR 7/4), yellowish-brown (10YR 5/8), and strong-brown (7.5YR 5/8) fine sand; single grain; loose; strongly acid.

The texture of the A horizon is uniformly loamy fine sand, but the color ranges from dark brown (10YR 3/3) to brown (10YR 5/3). The color of the B horizon ranges from yellowish brown (10YR 5/6 to 5/8) to strong brown (7.5YR 5/8). The depth to mottling ranges from about 18 to 30 inches. Thin, discontinuous textural bands commonly occur below a depth of 60 inches where the Berrien soils grade to the Chelsea soils. The reaction is commonly strongly acid; it grades to medium acid in some areas.

Blount Series

The Blount series consists of somewhat poorly drained soils that formed in highly calcareous silty clay loam to clay loam till of Wisconsin age. These soils formed under deciduous hardwood forest.

Blount soils have a finer textured B and C horizon than Crosby soils. The C horizon of the Blount soils is 28 to 38 percent clay; that of the Crosby soils is less than 28 percent clay. Blount soils have a lighter colored A horizon and a lighter textured B and C horizon than the Strole soils. Strole soils formed in silty clay or clay lacustrine material.

Profile of Blount loam in a cultivated field in NW¼NE¼ sec. 7, T. 30 N., R. 4 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; friable; few roots; medium acid; abrupt, smooth boundary.

B1—8 to 11 inches, brown (10YR 5/3) light clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak to moderate, medium, subangular blocky structure; firm; few roots; medium acid; clear, smooth boundary.

B21t—11 to 19 inches, dark-brown (10YR 4/3) light silty clay with many, medium, distinct, yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) mottles; moderate, coarse, angular blocky structure; very firm; few roots; thick, grayish-brown (10YR 5/2) organic and clay films on ped surfaces; medium acid; clear, smooth boundary.

B22t—19 to 29 inches, yellowish-brown (10YR 5/6) silty clay; common, medium, distinct, grayish-brown (10YR 5/2) and light brownish-gray (10YR 6/2) mottles; moderate, coarse, angular blocky structure; very firm, few roots; thick, dark-gray (10YR 4/1) organic and clay films on ped surfaces; slightly acid; clear, smooth boundary.

C1—29 to 35 inches, yellowish-brown (10YR 5/6) silty clay loam till; many, medium, distinct, gray (10YR 6/1), light brownish-gray (10YR 6/2) and dark yellowish-brown (10YR 4/4) mottles; moderate, coarse, angular blocky structure; firm; few roots; calcareous; clear, smooth boundary.

C2—35 to 42 inches +, gray (10YR 6/1) and light brownish-gray (10YR 6/2) silty clay loam till; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; firm; calcareous.

The texture of the Ap horizon is loam or silt loam, and the color is dark brown (10YR 3/3) to grayish brown (10YR 5/2). The depth to mottling ranges from 8 to 14 inches. The texture of the B2 horizon ranges from silty clay loam to silty clay. The depth to calcareous till ranges from 20 to 36 inches. The texture of the till ranges from clay loam to silty clay loam.

Brady Series

The Brady series consists of somewhat poorly drained soils that formed in sandy loam and loamy sand outwash, underlain by neutral to calcareous sand and gravel or stratified fine sand and silt at a depth of 42 to 70 inches or more. These soils formed under deciduous forest and grass.

Brady soils are in the catena that includes the well-drained Oshtemo, the moderately well drained Bronson, and the very poorly drained Gilford soils.

Brady soils differ from Morocco soils in that Morocco soils formed in deep, acid sands and lack a textural B horizon. Brady soils occur in close association with Aubbeenaubbee soils but differ in that Aubbeenaubbee soils are underlain by loamy glacial till at a depth of 20 to 36 inches.

Profile of Brady loamy fine sand in a cultivated field in SE¼SE¼ sec. 17, T. 30 N., R. 1 W.—

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, coarse, granular structure; very friable; strongly acid; clear, smooth boundary.

A2—8 to 13 inches, dark grayish-brown to dark-brown (10YR 4/2 to 4/3) heavy loamy sand; discontinuous streaks of brown (10YR 5/3); weak, medium granular structure; friable; strongly acid; abrupt, smooth boundary.

B1—13 to 16 inches, pale-brown (10YR 6/3) light sandy loam; many, medium, distinct, reddish-brown (5YR 4/4) and light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; friable; very dark grayish-brown (10YR 3/2) organic fillings in root channels; strongly acid; clear, smooth boundary.

B21t—16 to 22 inches, pale-brown (10YR 6/3) sandy loam; common, medium, distinct, dark-brown (7.5YR 4/4), light brownish-gray (10YR 6/2), and yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; friable; dark-gray (10YR 4/1) organic stains are common; very strongly acid; diffuse, smooth boundary.

B22tg—22 to 28 inches, gray (10YR 6/1) sandy loam; many, medium, distinct, pale-brown (10YR 6/3), dark-brown (7.5YR 4/4), and strong-brown (7.5YR 5/8) mottles; coarse, subangular blocky structure; friable; 3 percent coarse fragments; medium acid; diffuse, smooth boundary.

B23t—28 to 46 inches; light olive-brown (2.5Y 5/4) heavy sandy loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/8) mottles; moderate, coarse, subangular blocky structure; friable; 3 percent coarse fragments; slightly acid; clear, smooth boundary.

IIC1g—46 to 55 inches, light-gray (10YR 7/1) and dark grayish-brown (10YR 4/2) sand; single grain; loose; neutral; abrupt, smooth boundary.

IIC2g—55 to 60 inches +, light brownish-gray (2.5Y 6/2) sand; single grain; loose; few fine pebbles and an occasional cobblestone; calcareous.

The color of the surface horizon ranges from very dark gray (10YR 3/1) to dark brown (10YR 3/3). The thickness of the Ap and A2 horizons ranges from 7 to 14 inches. The texture of the B2 horizon ranges from sandy loam to sandy clay loam, but the thickness of the sandy clay loam is less than 10 inches. The texture of the C horizon varies throughout the county; it ranges from medium or coarse sand and a small amount of fine gravel to stratified sand and silt.

Bronson Series

The Bronson series consists of moderately well drained soils that formed in sandy loam and loamy sand outwash, underlain by neutral to calcareous sand and gravel at a depth of 42 to 70 inches or more. These soils formed under mixed deciduous forest.

Bronson soils are in the catena that includes the well-drained Oshtemo, the somewhat poorly drained Brady, and the very poorly drained Gilford soils.

Bronson soils differ from Berrien soils in that Berrien soils formed in deep, acid sand and have little, if any, evidence of a textural B horizon. Bronson soils and Chelsea soils differ in that Chelsea soils are well drained and have a thin, discontinuous B horizon.

Profile of Bronson loamy sand in a cultivated field in SE¼SE¼ sec. 17, T. 30 N., R. 1 W.—

Ap—0 to 10 inches, dark-brown (10YR 3/3) loamy sand; light brownish gray (10YR 6/2) when dry; weak, medium, granular structure; very friable; neutral; abrupt, smooth boundary.

A2—10 to 15 inches, yellowish-brown (10YR 5/4) loamy sand; weak, medium or coarse, granular structure; very friable; tongues of very dark grayish brown (10YR 3/2) extend down from Ap; strongly acid; clear, smooth boundary.

B11—15 to 21 inches, brownish-yellow (10YR 6/6) loamy sand; weak, coarse, subangular blocky structure; very friable; few strong-brown (7.5YR 5/8) iron stainings; very strongly acid; clear, smooth boundary.

B12—21 to 27 inches, reddish-yellow (7.5YR 6/8) and strong-brown (7.5YR 5/8) loamy sand; many, fine, distinct, pale brown (10YR 6/3) and very pale brown (10YR 7/3) mottles; weak, medium, subangular blocky structure; very friable; strongly acid; abrupt, smooth boundary.

B2g—27 to 38 inches, gray (10YR 6/1) and light brownish-gray (10YR 6/2) sandy loam; many, medium, distinct, light yellowish-brown (2.5Y 6/4) mottles; moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B3g—38 to 49 inches, gray (N 6/0) and light brownish-gray (2.5Y 6/2) light sandy loam; many, medium, yellowish-brown (10YR 5/8) and strong-brown (7.5YR 5/8) mottles; weak, coarse, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

IIC1g—49 to 59 inches, gray (10YR 6/1) and light-gray (10YR 7/1) sand; many, medium, dark-brown (10YR 4/3) mottles; single grain; loose; a band of brown (10YR 5/3) sand occurs 2 inches above the calcareous sand; neutral; abrupt, smooth boundary.

IIC2g—59 to 65 inches +, gray (10YR 6/1) sand; single grain; loose; 2 percent coarse fragments; calcareous.

The color of the surface horizon ranges from dark brown (10YR 3/3) to grayish brown (10YR 5/2). The depth to mottling ranges from 18 to 30 inches. The depth to the B2 horizon ranges from 26 to 46 inches. The texture of the B2 horizon ranges from sandy loam to sandy clay loam, and the thickness of the sandy clay loam is less than 10 inches. The sandy loam soil has a heavier textured B horizon than the loamy sand. The material in the C horizon is dominantly sand and a small amount of gravel.

Brookston Series

The Brookston series consists of dark-colored, very poorly drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 30 to 50 inches. These soils formed under marsh grass.

Brookston soils are in the catena that includes the well-drained Miami, the moderately well drained Celina, and the somewhat poorly drained Crosby soils. They occur with the well-drained Parr, the moderately well drained Corwin, and the somewhat poorly drained Odell soils. The Brookston soils and the moderately deep Westland soils are similar, but the Westland soils are underlain by calcareous sand and gravel rather than till. Brookston and Rensselaer soils differ in that Rensselaer soils are underlain by stratified silt and fine sand.

Profile of Brookston silt loam in a cultivated field in NE¼NW¼ sec. 34, T. 30 N., R. 1 W.—

Ap—0 to 7 inches, black (10YR 2/1) silt loam; moderate, coarse, granular structure; friable; neutral; abrupt, smooth boundary.

A12—7 to 11 inches, black (10YR 2/1) silt loam; moderate, medium, subangular blocky structure; friable; neutral; clear, wavy boundary.

B21tg—11 to 20 inches, very dark gray (10YR 3/1) light clay loam; common, fine, faint, gray (10YR 5/1) mottles; moderate, coarse, subangular blocky structure; friable; many black (10YR 2/1) organic fillings along root channels; numerous clay films on ped surfaces; neutral; clear, wavy boundary.

B22tg—20 to 40 inches, dark grayish-brown (10YR 4/2) clay loam; many, coarse, distinct, gray (10YR 6/1) mottles; moderate, coarse subangular blocky structure; firm; black (10YR 2/1) organic fillings in root channels; clay films on ped surfaces; neutral; clear, wavy boundary.

C—40 to 45 inches +, brownish-yellow (10YR 6/6) loam till; many, coarse, distinct, gray (10YR 6/1) mottles; massive; friable to firm; calcareous.

The texture of the A horizon is loam, mucky silt loam, silt loam, or silty clay loam. The color is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The total thickness of the Ap and A1 horizons ranges from 10 to 18 inches. The depth to calcareous till commonly is 36 to 44 inches, but in places it is as much as 60 inches. In some areas a thin stratum of sand and gravel as much as 6 inches thick occurs just above the calcareous till.

Carlisle Series

The Carlisle series consists of soils that formed in mixed organic material derived from woody, sedgy, and grassy plants. The organic material is medium acid to neutral and is more than 42 inches thick.

Carlisle soils differ from Tawas soils in that Tawas soils are underlain by sand and loamy sand at a depth of 12 to 42 inches. They differ from Edwards soils in that Edwards soils are underlain by marl at a depth of 12 to 42 inches.

Profile of Carlisle muck in a cultivated field in NW¼NW¼ sec. 10, T. 31 N., R. 1 W.—

Ap—0 to 8 inches, black (10YR 2/1) muck; weak, medium, granular structure; very friable; neutral; abrupt, smooth boundary.

2—8 to 12 inches, black (10YR 2/1) muck; weak, medium, granular structure; very friable; neutral; clear, wavy boundary.

3—12 to 30 inches, black (10YR 2/1) muck mixed with dark-brown (10YR 3/3) fibrous and woody peat; massive; friable; neutral; clear, wavy boundary.

4—30 to 44 inches +, dark-brown (10YR 3/3) fibrous and woody peat; partly decomposed; massive; friable; medium acid.

The thickness of the muck is quite variable, but generally it ranges from 18 to 30 inches. The total thickness of organic material is 42 inches or more. The muck is dominantly black (10YR 2/1). The peaty horizons are dark brown (10YR 3/3) to black (10YR 2/1).

Celina Series

The Celina series consists of moderately well drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 26 to 42 inches. These soils formed under deciduous forest.

Celina soils are in the catena that includes the well-drained Miami, the somewhat poorly drained Crosby, and the dark-colored, very poorly drained Brookston soils. They occur in close association with Metea soils, but Metea soils formed in 20 to 36 inches of loamy sand over loam or light clay loam till.

Profile of Celina fine sandy loam in a cultivated field in NE¼SE¼ sec. 3, T. 29 N., R. 2 W.—

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

A2—10 to 14 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; few dark grayish-brown (10YR 4/2) organic fillings; medium acid; clear, wavy boundary.

B1—14 to 21 inches, yellowish-brown (10YR 5/6) loam; few, fine, distinct, pale-brown (10YR 6/3) mottles in lower part; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B2t—21 to 37 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; firm; dark yellowish-brown (10YR 4/4) clay films on many ped surfaces; slightly acid; clear, wavy boundary.

C—37 to 48 inches +, yellowish-brown (10YR 5/6) loam till; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable; calcareous.

The texture of the surface layer is fine sandy loam. It is very dark grayish brown (10YR 3/2) in wooded areas. In the fine sandy loam, the thickness of the A horizon varies, but it commonly is 10 to 14 inches. The depth to mottling ranges from 18 to 30 inches, but commonly is 20 to 24 inches. The reaction of the B horizon is strongly acid to slightly acid. The depth to calcareous till ranges from 26 to 42 inches. The texture of the till is predominantly loam.

Chelsea Series

The Chelsea series consists of excessively drained, weakly developed soils that formed in very strongly acid and strongly acid sandy glacial drift material that has been reworked by wind. These soils formed under deciduous forest.

Chelsea soils differ from Plainfield soils in having one or more textural B horizons at a depth of less than 60 inches. They differ from Oshtemo soils in having a thinner B horizon. Chelsea soils differ from Metea soils in that Metea soils formed in 20 to 36 inches of sandy material over loam till.

Profile of Chelsea fine sand in a permanent pasture in NE¼SW¼ sec. 14, T. 30 N., R. 2 W.—

A1—0 to 5 inches, very dark grayish-brown (10YR 3/2) fine sand; weak, fine, granular structure; very friable; very strongly acid; abrupt, wavy boundary.

A2—5 to 45 inches, brown (10YR 5/3)fine sand; single grain; loose; few, weak, discontinuous, yellowish-brown (10YR 5/4) color bands at a depth between 30 and 45 inches; strongly acid; abrupt, smooth boundary.

Bt1—45 to 47 inches, dark-brown (7.5YR 4/4) loamy fine sand; weak, medium, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary.

A21—47 to 49 inches, light yellowish-brown (10YR 6/4) fine sand; single grain; loose; strongly acid; abrupt, smooth boundary.

Bt2—49 to 51 inches, dark-brown (7.5YR 4/4) loamy fine sand; weak, medium, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary.

A22—51 to 53 inches, light yellowish-brown (10YR 6/4) fine sand; single grain; loose; medium acid; abrupt, smooth boundary.

A&B—53 to 70 inches +, alternating ½-inch to 3-inch bands of Bt horizon material separated by A2 horizon material.

The texture of the surface layer is uniformly fine sand. In cultivated areas the Ap horizon is 6 to 8 inches thick and ranges from very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4). The depth to the first textural or color band ranges from 24 to 55 inches. The thickness of the bands is ½ inch to 4 inches. The bands are discontinuous horizontally, but they occur as alternating layers for several feet throughout the profile. The reaction of the soil in the upper 4 feet ranges from very strongly acid to strongly acid; below this depth it grades to medium acid.

Conover Series

The Conover series consists of somewhat poorly drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 24 to 42 inches. These soils formed under prairie grass and deciduous forest.

Conover soils occur in close association with Crosby soils but have a darker colored Ap horizon. Conover soils have a thinner, lighter colored A horizon than Odell soils.

Profile of Conover loam in a cultivated field in SE¼ NW¼ sec. 22, T. 30 N., R. 1 W.—

Ap—0 to 9 inches, very dark gray (10YR 3/1) loam; moderate, medium, granular structure; friable; strongly acid; abrupt, smooth boundary.

A2—9 to 13 inches, dark grayish-brown (2.5Y 4/2) loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, granular structure; friable; many very dark gray (10YR 3/1) organic fillings; strongly acid; clear, smooth boundary.

B21t—13 to 19 inches, dark grayish-brown (2.5Y 4/2) clay loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; clay films on many ped surfaces; medium acid; clear, wavy boundary.

B22tg—19 to 28 inches, grayish-brown (2.5YR 5/2) light clay loam; common, fine, distinct, strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; friable; clay films on many ped surfaces; slightly acid; abrupt, wavy boundary.

C—28 to 42 inches +, mottled grayish-brown (2.5Y 5/2) and strong-brown (7.5YR 5/8) loam till; massive; friable; calcareous.

The Ap horizon is loam or silt loam, is very dark gray (10YR 3/1) or very dark grayish brown (10YR 3/2), and is 7 to 9 inches thick. The depth to mottling is 8 to 15 inches. The depth to calcareous till ranges from 24 to 42 inches, but it commonly is 24 to 30 inches. The texture of the till is predominantly loam.

Corwin Series

The Corwin series consists of moderately well drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 30 to 42 inches. These soils formed under prairie grass.

Corwin soils are in the catena that includes the well-drained Parr and the somewhat poorly drained Odell soils. Corwin soils differ from Foresman soils in that Foresman soils have a coarser textured solum and are underlain by stratified silt and fine sand.

Profile of Corwin loam in a cultivated field in SE¼ SW¼ sec. 20, T. 29 N., R. 4 W.—

Ap—0 to 9 inches, very dark brown (10YR 2/2) loam; weak, coarse, granular structure; friable; medium acid; clear, smooth boundary.

A12—9 to 12 inches, very dark brown (10YR 2/2) loam; moderate, coarse, granular structure; friable; medium acid; clear, wavy boundary.

A3—12 to 15 inches, very dark grayish-brown (10YR 3/2) loam; weak, coarse, granular structure; friable; strongly acid; clear, wavy boundary.

B21t—15 to 24 inches, dark yellowish-brown (10YR 4/4) light clay loam; weak, coarse, subangular blocky structure; friable; few very dark grayish-brown (10YR 3/2) organic fillings; thin clay films on ped surfaces; strongly acid; clear, wavy boundary.

B22t—24 to 31 inches, yellowish-brown (10YR 5/6) clay loam; common, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, coarse, subangular blocky structure; firm; thin clay films on ped surfaces; strongly acid in the upper part and slightly acid in the lower part; clear, wavy boundary.

C—31 to 42 inches +, yellowish-brown (10YR 5/6) loam till; many, medium, distinct, pale-brown (10YR 6/3) mottles; massive; friable; calcareous.

The texture of the A horizon is loam or silt loam, and the color ranges from very dark brown (10YR 2/2) to dark brown (10YR 3/3). The depth to mottling ranges from 18 to 30 inches, but commonly it is 20 to 26 inches. The depth to calcareous till ranges from 30 to 42 inches, depending upon the thickness of the B horizon. The texture of the till is predominantly loam.

Crosby Series

The Crosby series consists of somewhat poorly drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 24 to 42 inches. These soils formed under deciduous forest.

Crosby soils are in the catena that includes the well-drained Miami, the moderately well drained Celina, and the dark-colored, very poorly drained Brookston soils. Crosby soils differ from Blount soils in that the Blount soils have a finer textured B horizon and formed in silty clay loam till. Crosby soils occur in close association with Aubbeenaubbee soils, but Aubbeenaubbee soils formed in 20 to 36 inches of loamy sand to fine sandy loam over loam till.

Profile of Crosby fine sandy loam in a cultivated field in SE¼NE¼ sec. 16, T. 30 N., R. 2 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—8 to 12 inches, pale-brown (10YR 6/3) fine sandy loam; few, fine, faint, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; friable; slightly acid; clear, wavy boundary.

B1—12 to 16 inches, pale-brown (10YR 6/3) loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

B2tg—16 to 32 inches, dark grayish-brown (10YR 4/2) clay loam; many, medium, faint, grayish-brown (10YR 5/2) mottles; moderate, coarse, subangular blocky structure; firm; clay films on many ped surfaces; slightly acid; clear, wavy boundary.

C—32 to 42 inches +, yellowish-brown (10YR 5/6) loam till; many, medium, distinct, gray (10YR 6/1) mottles; massive; friable; calcareous.

The texture of the Ap horizon is fine sandy loam, loam, or silt loam. The color ranges from dark brown (10YR 3/3) to grayish brown (10YR 5/2). The A horizon of the fine sandy loam varies in thickness, but it commonly is 10 to 14 inches thick. Crosby soils grade to Aubbeenaubbee soils where the fine sandy loam A horizon exceeds 18 inches in thickness. The depth to mottling ranges from 8 to 15 inches. The depth to calcareous till ranges from 24 to 42 inches, but it commonly is 28 to 34 inches. The texture of the till is predominantly loam. The reaction of the subsoil is medium acid to slightly acid.

Darroch Series

The Darroch series consists of somewhat poorly drained soils that formed in glaciofluvial and lacustrine deposits of stratified calcareous silt and fine sand. These soils formed under prairie grass.

The Darroch soils are in the catena that includes the moderately well drained Foresman and the very poorly drained Rensselaer soils.

Darroch soils have a coarser textured solum and substratum than Strole soils. They differ from Odell soils, in that Odell soils formed in loam till. They have a darker colored A horizon, are finer textured, and are less leached than Brady soils.

Profile of Darroch silt loam in a cultivated field in NE¼NE¼ sec. 31, T. 30 N., R. 4 W.—

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

A3—8 to 12 inches, dark yellowish-brown (10YR 3/4) heavy silt loam; weak, coarse, granular structure; friable; strongly acid; clear, wavy boundary.

B21t—12 to 18 inches, dark grayish-brown (10YR 4/2) light silty clay loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; friable; thin clay films on ped surfaces; slightly acid; clear, wavy boundary.

B22t—18 to 30 inches, dark grayish-brown (10YR 4/2) gritty silty clay loam; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, coarse, subangular blocky structure; firm; thin clay films on ped surfaces; slightly acid; clear, smooth boundary.

C1—30 to 36 inches, yellowish-brown (10YR 5/4) silt; common, medium, distinct, gray (10YR 5/1) mottles; massive; firm; calcareous; clear, wavy boundary.

IIC2—36 to 52 inches +, pale-brown (10YR 6/3) fine sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; friable; calcareous.

The texture of the Ap horizon is loam or silt loam, and the color is black (10YR 2/1) or very dark brown (10YR 2/2). The total thickness of the A horizon ranges from 10 to 14 inches. The reaction is medium acid to slightly acid. The depth to mottling ranges from 10 to 15 inches. In texture the B2 horizon ranges from sandy clay loam to silty clay loam, and in reaction from medium acid to slightly acid. The solum ranges from 24 to 42 inches in thickness, but it is generally 28 to 32 inches thick. The texture of the C horizon is predominantly silt and fine sand, but lenses of coarse sand or fine gravel and thin strata of clay occur in some areas. A substratum of silty clay or clay occurs at a depth of 24 to 48 inches in some places.

Edwards Series

The Edwards series consists of very poorly drained organic soils that formed in decomposed plant remains. The organic layer is relatively shallow and underlain by highly calcareous marl at a depth of 12 to 42 inches.

Edwards soils differ from Tawas soils in that Tawas soils are underlain by sand and loamy sand. They differ from Carlisle soils in that Carlisle soils formed in organic deposits more than 42 inches thick.

Profile of Edwards muck in a cultivated field in NW¼NW¼ sec. 25, T. 29 N., R. 1 W.—

Ap—0 to 8 inches, black (10YR 2/1) muck; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

2—8 to 15 inches, black (10YR 2/1) muck; weak, medium, granular structure; very friable; neutral; clear, wavy boundary.

3—15 to 19 inches, black (10YR 2/1) and very dark gray (10YR 3/1) muck; moderate, medium, granular structure; very friable; mixing of few shell fragments; mildly alkaline; abrupt, wavy boundary.

IIC—19 to 50 inches +, light-gray (10YR 7/1) marl containing numerous small shells; massive; very friable; calcareous.

The thickness of the organic layer ranges from 12 to 42 inches, but it commonly is 18 to 24 inches. In some areas a high proportion of sandy material is mixed with the marl. The reaction ranges from medium acid to mildly alkaline in the organic material.

Eel Series

The Eel series consists of moderately well drained soils that are forming in alluvium derived from highly calcareous drift of Wisconsin age.

The Eel soils are in the catena that includes the very poorly drained Sloan soils. They are closely associated with Abscota soils, but Abscota soils are well drained and were derived from coarser textured material.

Profile of Eel loam in a cultivated field in NE¼SE¼ sec. 30, T. 30 N., R. 1 W.—

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) light loam; moderate, fine or medium, granular structure; friable; mildly calcareous; abrupt, smooth boundary.

C1—7 to 21 inches, dark grayish-brown (10YR 4/2) heavy loam; weak, coarse, subangular blocky structure; friable; few yellowish-brown (10YR 5/6) iron stains; neutral; abrupt, smooth boundary.

C2—21 to 30 inches +, dark-brown (10YR 4/3) and brown (10YR 5/3) stratified fine sandy loam and loam; common, fine, faint, dark-gray (10YR 4/1) mottles; massive; friable; few strong-brown (7.5YR 5/6) iron stains; neutral.

The color of the Ap horizon is very dark grayish brown (10YR 3/2) in some areas. The depth to mottling ranges from 18 to 30 inches. The reaction of the solum ranges from slightly acid to calcareous. In the till areas of the county, this soil is underlain by glacial till, which occurs at a depth of 36 to 42 inches.

Foresman Series

The Foresman series consists of moderately well drained soils that formed in lacustrine deposits of stratified silt and fine sand. These soils formed under prairie grass.

Foresman soils are in the catena that includes the somewhat poorly drained Darroch and the very poorly drained Rensselaer soils. Foresman and Corwin soils differ in that Corwin soils formed in loam till.

Profile of Foresman loam in a cultivated field in NE¼ SE¼ sec. 21, T. 30 N., R. 4 W.—

Ap—0 to 9 inches, very dark gray (10YR 3/1) loam; moderate, medium, granular structure; friable; slightly acid; clear, wavy boundary.

A12—9 to 14 inches, very dark gray (10YR 3/1) loam; moderate, medium, granular structure; friable; slightly acid; abrupt, wavy boundary.

B1—14 to 20 inches, light olive-brown (2.5Y 5/4) heavy loam; moderate, coarse, subangular blocky structure; friable; few very dark gray (10YR 3/1) organic fillings; medium acid; clear, wavy boundary.

B21t—20 to 28 inches, light olive-brown (2.5Y 5/4) clay loam; common, medium, distinct, grayish-brown (2.5Y 5/2) and brownish-yellow (10YR 6/8) mottles; moderate, medium, subangular blocky structure; friable; thin clay films on many ped surfaces; few very dark gray (10YR 3/1) organic fillings; medium acid or slightly acid; clear, wavy boundary.

B22t—28 to 36 inches, mottled grayish-brown (2.5Y 5/2) and brownish-yellow (10YR 6/8) heavy clay loam; moderate, medium, subangular blocky structure; firm; neutral; thin clay films on many ped surfaces; abrupt, wavy boundary.

Cg—36 to 44 inches +, stratified light olive-gray (5Y 6/2) silt and dark-gray (5Y 4/1) fine sand; massive; friable; calcareous.

The color of the Ap horizon is black (10YR 2/1) to very dark gray (10YR 3/1). The total thickness of the A horizons ranges from 12 to 16 inches. The depth to mottling ranges from 20 to 30 inches and commonly is 20 to 26 inches. The texture of the B2 horizon ranges from light clay loam to silty clay loam. The thickness of the solum ranges from 30 to 44 inches. The texture of the C horizon is predominantly silt and fine sand; however, lenses of coarse sand and thin strata of clay occur in some areas.

A group of Foresman soils has a fine sandy loam surface layer and differs enough from the typical soils of the series to be considered a variant. A separate profile description is given for this group.

Profile of Foresman fine sandy loam, sandy variant, in a cultivated field in SE¼NE¼ sec. 31, T. 30 N., R. 4 W.—

Ap—0 to 10 inches, black (10YR 2/1) fine sandy loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.

B11—10 to 23 inches, yellowish-brown (10YR 5/4) light fine sandy loam; weak, medium, granular structure; very friable; strongly acid; gradual, wavy boundary.

B12—23 to 35 inches, yellowish-brown (10YR 5/6) loamy fine sand; common, medium, distinct, strong-brown (7.5YR 5/6) and pale-brown (10YR 6/3) mottles; weak, medium, granular structure; very friable; a few small iron concretions; strongly acid; clear, smooth boundary.

B21t—35 to 40 inches, light-gray (10YR 7/1) light sandy clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; strongly acid; clear, wavy boundary.

B22t—40 to 44 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) and light-gray (10YR 7/2) mottles; weak, medium, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

B3—44 to 47 inches, light yellowish-brown (10YR 6/4) loamy fine sand; few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, medium, granular structure; very friable; neutral; abrupt, smooth boundary.

C—47 to 50 inches +, light-gray (10YR 7/1) silt with lenses of very fine sand; many, medium, distinct, yellowish-brown (10YR 5/4) and light olive-brown (2.5Y 5/4) mottles; firm; massive; calcareous.

The color of the Ap horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The thickness of the A horizon ranges from 10 to 13 inches. The depth to mottling is 18 to 30 inches. The texture of the B2 horizon is loam to sandy clay loam. The thickness of the solum ranges from 40 to 56 inches. The C horizon is predominantly silt and fine sand, although it contains lenses of coarse sand or fine gravel and thin strata of clay in some areas. At a depth of 36 to 48 inches a silty clay or clay substratum occurs in places.

Fox Series

The Fox series consists of well-drained soils that formed in silty or loamy outwash material underlain by stratified calcareous sand and gravel at a depth of 24 to 42 inches. These soils formed under mixed deciduous forest.

Fox soils are in the catena that includes the dark-colored, very poorly drained, moderately deep Westland soils. Fox soils and Oshtemo soils differ in that Oshtemo soils have a coarser textured solum, and the depth to calcareous sand and gravel ranges from 42 to 70 inches. Fox soils and Chelsea soils differ in that Chelsea soils formed in deep, strongly acid sand and loamy sand.

Profile of Fox sandy loam in a road cut in NW¼ sec. 36, T. 29 N., R. 3 W.—

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—5 to 9 inches, brown (10YR 5/3) sandy loam; weak, medium and coarse, granular structure; friable; medium acid; abrupt, smooth boundary.

B1—9 to 19 inches, yellowish-brown (10YR 5/6) gravelly heavy sandy loam; weak to moderate, medium,

granular structure; friable; much fine gravel; very strongly acid; clear, smooth boundary.
B21t—19 to 26 inches, strong-brown (7.5YR 5/6) gravelly sandy clay loam; moderate, fine and medium, subangular blocky structure; firm; much fine gravel; strongly acid; clear, smooth boundary.
B22t—26 to 31 inches, dark-brown (7.5YR 4/4) to reddish-brown (5YR 4/4) gravelly clay loam; moderate, medium and coarse, subangular blocky structure; firm; few clay films on gravel and ped faces; much fine gravel; medium acid; clear, wavy boundary
B23t—31 to 35 inches, reddish-brown (5YR 4/4) gravelly heavy clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on ped faces; much fine gravel; tongues extend 8 to 10 inches into the C horizon; medium acid; abrupt, irregular boundary.
IIC—35 to 42 inches +, light-gray (10YR 7/2) stratified sand and gravel; single grain; loose; calcareous.

Coarse fragments vary in amount and range in size from coarse gravel to cobblestones. Tongues of the B horizon commonly extend into the C horizon and range from 6 to 15 inches in thickness. The depth to calcareous sand and gravel is 30 to 42 inches.

Gilford Series

The Gilford series consists of very poorly drained soils that formed in 42 to 66 inches of sandy loam to loam outwash material over neutral to calcareous sand and gravel. Stratified fine sand and silt may occur in the underlying material. These soils formed under marsh grass.

Gilford soils are in the catena that includes the well-drained Oshtemo, the moderately well drained Bronson, and the somewhat poorly drained Brady soils. Gilford soils occur with the Maumee soils but differ from them in having a finer textured solum. They have a coarser textured Bg horizon than the moderately deep Westland soils and are underlain by calcareous sand and gravel at a depth of less than 42 inches. Gilford soils also have a coarser textured Bg horizon than Rensselaer soils.

Profile of Gilford fine sandy loam in a cultivated field in NE¼NE¼ sec. 15, T. 30 N., R. 1 W.—

Ap—0 to 8 inches, black (10YR 2/1) fine sandy loam; weak, medium, granular structure; very friable; slightly acid; abrupt, smooth boundary.
A12—8 to 12 inches, very dark gray (10YR 3/1) fine sandy loam; weak, medium, subangular blocky structure; very friable; slightly acid; gradual, wavy boundary.
B21g—12 to 18 inches, gray (10YR 5/1) heavy fine sandy loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; friable; slightly acid; clear, irregular boundary.
B22g—18 to 28 inches, gray (10YR 6/1) light sandy loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.
B3g—28 to 34 inches, gray (10YR 5/1) sandy loam and some fine gravel; few, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; slightly acid; clear, wavy boundary.
IIC1g—34 to 46 inches, gray (10YR 6/1) loamy sand (50 percent fine gravel); single grain; loose; neutral; few, medium, distinct, yellowish-brown (10YR 5/6) mottles; clear, wavy boundary.
IIC2g—46 to 66 inches +, gray (10YR 6/1) medium sand and a small amount of fine gravel; single grain; loose; neutral in upper part, becoming calcareous in lower part.

The texture of the Ap horizon is fine sandy loam or loam, and the color ranges from black (10YR 2/1) to very dark grayish brown (10 YR 3/2). The total thickness of the A horizon ranges from 12 to 18 inches.

The Bg horizon varies in texture, and where it is sandy clay loam it does not exceed 10 inches in thickness. In some areas there is an accumulation of soft "bog iron" in the solum. The reaction of the solum is normally slightly acid or neutral, but it is medium acid in some areas. The C horizon consists mostly of medium sand and a small amount of fine gravel, although stratified fine sand and silt occur in some areas. Till occurs in the substratum in some areas, and it is at a depth of 42 to 54 inches.

Homer Series

The Homer series consists of somewhat poorly drained soils that formed in loamy outwash material over calcareous sand and gravel. These soils formed under mixed deciduous forest.

Homer soils have a thicker B horizon than the Brady soils. Homer soils occur with Aubbeenaubbee soils, but Aubbeenaubbee soils are underlain by loam till at a depth of 20 to 36 inches.

Profile of Homer sandy loam in a cultivated field in NW¼SE¼ sec. 30, T. 30 N., R. 1 W.—

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) sandy loam; moderate, medium, granular structure; friable; neutral; abrupt, smooth boundary.
A2—7 to 11 inches, brown (10YR 5/3) sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; many dark grayish-brown (10YR 4/2) organic fillings in root channels; slightly acid; clear, smooth boundary.
B1—11 to 14 inches, brown (10YR 5/3) to pale-brown (10YR 6/3) loam; many, medium, distinct, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; friable; neutral; clear, smooth boundary.
B21tg—14 to 23 inches, grayish-brown (10YR 5/2) clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; firm; clay films on ped surfaces; strongly acid; clear, wavy boundary.
B22tg—23 to 36 inches, gray (10YR 5/1) sandy clay loam with many, medium, distinct, dark-brown (10YR 3/3) and yellowish-brown (10YR 5/6) mottles; moderate, coarse, subangular blocky structure; firm; thin clay films on ped surfaces; strongly acid; gradual, wavy boundary.
B3g—36 to 43 inches, dark-gray (10YR 4/1) light gravelly clay loam; few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; friable; slightly acid; clear, smooth boundary.
IIC1g—43 to 55 inches, dark-gray (10YR 4/1) coarse and very coarse sand; single grain; loose; neutral; clear, wavy boundary.
IIC2g—55 to 60 inches +, gray (10YR 5/1) very coarse sand and fine gravel; single grain; loose; calcareous.

The texture of the Ap horizon is uniformly sandy loam, but the color ranges from grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2). Depth to mottling ranges from 7 to 14 inches. The texture of the B2 horizon ranges from sandy clay loam to clay loam. The thickness of the solum ranges from 36 to 50 inches.

The C horizon consists of sand and a small amount of fine gravel. The reaction of the C1 horizon is neutral to calcareous.

Hoopeston Series

The Hoopeston series consists of somewhat poorly drained soils that formed in glaciofluvial and lacustrine deposits of stratified very fine sand, fine sand, and some silt. These soils formed under prairie grass.

Hoopeston soils have a sandy loam to light sandy clay loam B horizon, as compared with the closely associated Darroch soils, which have a silty clay loam to clay loam B horizon. They differ from Odell soils in that Odell soils have a clay loam B horizon and are underlain by calcareous loam till.

Profile of Hoopeston fine sandy loam in a cultivated field in NE¼NW¼ sec. 10, T. 29 N., R. 4 W.—

A1p—0 to 9 inches, black (10YR 2/1) fine sandy loam; weak, medium, granular structure; friable; numerous fine roots; medium acid; abrupt, smooth boundary.

A12—9 to 12 inches, very dark gray (10YR 3/1) fine sandy loam; weak, coarse, subangular blocky structure; friable; few roots; medium acid; clear, wavy boundary.

B1g—12 to 23 inches, dark grayish-brown (10YR 4/2) fine sandy loam; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; some mixing of very dark gray (10YR 3/1) material in upper part; weak, coarse, subangular blocky structure; friable; slightly acid; gradual, wavy boundary.

B2t—23 to 33 inches, brown (10YR 5/3) sandy loam to light sandy clay loam; many, medium, distinct, strong-brown (7.5YR 5/8) and dark grayish-brown (10YR 4/2) mottles; moderate, medium, subangular blocky structure; firm; many dark grayish-brown (10YR 4/2) fillings along root channels; slightly acid; abrupt, wavy boundary.

C1—33 to 38 inches, mottled pale-brown (10YR 6/3) and strong-brown (7.5YR 5/8) fine and very fine sand; common, medium, distinct, gray (10YR 5/1) mottles; massive; loose; slightly acid; clear, wavy boundary.

C2—38 to 50 inches +, mottled light brownish-gray (10YR 6/2) and very pale brown (10YR 7/4) fine and very fine sand; massive; loose; calcareous.

The texture of the Ap horizon is uniformly fine sandy loam, but the color is black (10YR 2/1) to dark brown (10YR 3/3). The thickness of the A horizon ranges from 10 to 14 inches. The depth to mottling is 10 to 15 inches. The texture of the B2 horizon ranges from sandy loam to light sandy clay loam. The thickness of the solum ranges from about 30 to 44 inches and averages 36 to 40 inches. The texture of the C horizon is predominantly fine sand and very fine sand. Thin strata of silt commonly occur where Hoopeston soils grade to the Darroch soils. Till commonly occurs at a depth of 48 to 60 inches or more.

Maumee Series

The Maumee series consists of very poorly drained soils that formed in neutral to calcareous sand under a marsh grass.

Maumee soils occur with Newton soils but differ in that Newton soils formed in very strongly acid and strongly acid sand. They have a coarser textured Bg horizon than Gilford soils. They have a coarser textured B horizon than Rensselaer soils, which are underlain by stratified silt and fine sand.

Profile of Maumee fine sandy loam in a cultivated field in NE¼NW¼ sec. 14, T. 30 N., R. 4 W.—

Ap—0 to 10 inches, black (10YR 2/1) fine sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

A12—10 to 16 inches, black (10YR 2/1), with some mixing of dark-gray (10YR 4/1), loamy fine sand; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; very friable; neutral; gradual, smooth boundary.

Bg—16 to 28 inches, grayish-brown (10YR 5/2) loamy fine sand; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, coarse, subangular blocky structure; very friable; many dark-gray (10YR 4/1) organic fillings in root channels; neutral; clear, smooth boundary.

C—28 to 50 inches +, gray (10YR 5/1) fine sand; few, coarse, distinct, yellowish-brown (10YR 5/6) mottles; single grain; loose; neutral.

The texture of the surface layer is fine sandy loam or loamy fine sand. The color of the Ap horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The total thickness of the A horizons ranges from 12 to 18 inches. Thin strata of sandy loam to light sandy clay loam as much as 3 inches thick occur in the Bg horizon in some areas. The reaction of the A and the Bg horizons ranges from medium acid to neutral. In some areas there is an accumulation of soft "bog iron" in the solum.

Mermill Series

The Mermill series consists of very poorly drained soils that formed in 24 to 36 inches of medium-textured drift over fine-textured till or lacustrine material. These soils formed under marsh grass.

Mermill soils are similar to Brookston soils in the upper part of the solum but are finer textured in the lower part. They are similar to Rensselaer soils, but those soils are medium textured in the lower part of the solum and are underlain by stratified silt and fine sand.

Profile of Mermill silt loam in a cultivated field in NE¼NW¼ sec. 31, T. 31 N., R. 4 W.—

A1p—0 to 6 inches, black (10YR 2/1) silt loam; moderate, coarse, granular structure; friable; slightly acid; abrupt, smooth boundary.

A12—6 to 10 inches, black (10YR 2/1) silt loam; weak, medium, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

A3—10 to 13 inches, very dark gray (10YR 3/1) loam; few, fine, faint, olive-brown (2.5Y 4/4) mottles; weak, fine and medium, subangular blocky structure; friable; few small pockets of black (10YR 2/1) A horizon; slightly acid; abrupt, wavy boundary.

B2tg—13 to 23 inches, gray (2.5Y N 5/0) light silty clay loam; common, fine, distinct, grayish-brown (2.5Y 4/2) and yellowish-brown (10YR 5/4) mottles; moderate, medium, prismatic structure that breaks to moderate, medium, angular blocky structure; firm; thin, very dark brown (10YR 2/2), discontinuous clay films on many ped surfaces; neutral; clear, smooth boundary.

B31—23 to 31 inches, mottled light olive-brown (2.5Y 5/6), gray (5Y 5/1), and olive-gray (5Y 5/2) heavy sandy loam; moderate, medium and coarse, subangular blocky structure; friable: neutral; abrupt, smooth boundary.

IIB32—31 to 42 inches, mottled yellowish-brown (10YR 5/8), gray (N 5/0), and light olive-brown (2.5Y 5/4) silty clay loam; moderate; coarse, angular blocky structure; firm; calcareous; clear, wavy boundary.

IIC—42 to 50 inches +, mottled yellowish-brown (10YR 5/8), gray (N 5/0), and light olive-brown (2.5Y 5/4) silty clay loam; massive; firm; calcareous.

The color of the Ap horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The total thickness of the A horizons ranges from 11 inches to 18 inches. The texture of the B2tg horizon varies considerably. It ranges from heavy loam to clay loam, sandy clay loam, or silty clay loam. The texture of the B3 horizon ranges from heavy sandy loam to silty clay loam. The depth to the heavier textured material in the lower part of the B horizon ranges from 24 to 36 inches. The texture of this material is heavy clay loam to silty clay. The upper part of the heavier textured material has some degree of development, and a weak to moderate, subangular or angular blocky or prismatic structure is generally evident. Thin strata of sand and silt occur in the C horizon in some areas.

Metea Series

The Metea series consists of well drained and moderately well drained soils that formed in 20 to 36 inches of loamy sand or sandy loam over material weathered from loam or light clay loam till. The depth to calcareous till ranges from 40 to 54 inches. These soils formed under deciduous forest.

Metea soils are in the catena that includes the somewhat poorly drained Aubbeenaubbee soils. They occur with Miami soils but differ in that Miami soils are finer textured in the upper part of the solum. They differ from Seward soils in that those soils formed in 18 to 42 inches of loamy sand over silty clay loam or silty clay material.

Profile of Metea loamy fine sand in a cultivated field in NW¼NW¼ sec. 35, T. 30 N., R. 1 W.—

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy fine sand, light brownish gray (10YR 6/2) when dry; weak, fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

A21—8 to 18 inches, yellowish-brown (10YR 5/4) fine sand; single grain; loose; medium acid; gradual, wavy boundary.

A22—18 to 32 inches, light yellowish-brown (10YR 6/4) fine sand; single grain; loose; strongly acid; abrupt, wavy boundary.

IIB2t—32 to 44 inches, dark-brown (10YR 4/3) clay loam; coarse, subangular blocky structure; friable; light yellowish-brown (10YR 6/4) sand coatings on many ped faces; strongly acid; clear, wavy boundary.

IIC—44 to 50 inches +, brown (10YR 5/3) loam till; massive; friable; calcareous.

The total thickness of the A horizons ranges from 20 to 36 inches, but it is commonly 24 to 34 inches. Where the sand overburden approaches 36 inches, the B horizon is only 4 to 10 inches thick. Mottling occurs at a depth of 24 to 30 inches in some areas. The depth to calcareous loam till ranges from 40 to 54 inches.

Miami Series

The Miami series consists of well-drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 26 to 42 inches. These soils formed under deciduous forest.

Miami soils are in the catena that includes the moderately well drained Celina, the somewhat poorly drained Crosby, and the dark-colored, very poorly drained Brookston soils. Miami and Metea soils occur in close association, but Metea soils have 20 to 36 inches of loamy sand over light clay loam till.

Profile of Miami fine sandy loam in NW¼NW¼ sec. 24, T. 31 N., R. 1 W.—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

A2—8 to 11 inches, brown (10YR 5/3) heavy fine sandy loam; weak, thin, platy structure; friable; few dark grayish-brown (10YR 4/2) organic fillings in old root channels; slightly acid; abrupt, smooth boundary.

B1t—11 to 18 inches, yellowish-brown (10YR 5/4) heavy loam; moderate, fine, subangular blocky structure; friable; thin, dark yellowish-brown (10YR 474) clay films on ped surfaces; 3 percent coarse fragments; slightly acid; clear, wavy boundary.

B21t—18 to 26 inches, yellowish-brown (10YR 5/6) clay loam; moderate, medium, subangular blocky structure; firm; dark yellowish-brown (10YR 4/4) clay films on ped surfaces; 3 percent coarse fragments; medium acid; clear, wavy boundary.

B22t—26 to 36 inches, yellowish-brown (10YR 5/4) light clay loam; moderate, medium, subangular blocky structure; firm; dark yellowish-brown (10YR 4/4) clay films on ped surfaces; 3 percent coarse fragments; slightly acid; clear, wavy boundary.

C—36 to 42 inches +, yellowish-brown (10YR 5/4) loam till; massive; friable; calcareous.

The texture of the surface layer is fine sandy loam or loam. The color ranges from dark yellowish brown (10YR 4/4) in cultivated areas to very dark grayish brown (10YR 3/2) in wooded areas. Where the surface layer is fine sandy loam, the A horizon varies in thickness but commonly is 10 to 14 inches thick, and the B1 horizon ranges from loam to heavy loam in texture and from 4 to 7 inches in thickness. The texture of the B21 and B22 horizons is predominantly clay loam. Miami soils grade to Metea soils where the fine sandy loam exceeds 18 inches in thickness. The depth to calcareous till is 26 to 42 inches. The texture of the till is predominantly loam.

Montgomery Series

The Montgomery series consists of very poorly drained soils that formed in lacustrine deposits of calcareous silty clay and clay. These soils formed under marsh grass.

Montgomery soils are closely associated with the somewhat poorly drained Strole soils. They have a finer textured solum and substratum than Rensselaer soils. They differ from Brookston soils in that Brookston soils formed in loam till and have a coarser textured solum.

Profile of Montgomery silty clay in a cultivated field in NW¼NW¼ sec. 29, T. 30 N., R. 4 W.—

Ap—0 to 6 inches, very dark brown (10YR 2/2) silty clay; moderate, medium, granular structure; firm; neutral; clear, wavy boundary.

A12—6 to 12 inches, very dark brown (10YR 2/2) silty clay; moderate, medium, subangular blocky structure; firm; neutral; gradual, wavy boundary.

B21g—12 to 20 inches, dark grayish-brown (2.5Y 4/2) silty clay with many, medium, distinct, very dark gray (N 3/0) mottles; moderate, coarse, angular blocky structure; very firm; shiny faces on all ped surfaces; neutral; clear, wavy boundary.

B22g—20 to 30 inches, gray to grayish-brown (2.5Y 5/0 to 5/2) silty clay with many, medium, distinct, light olive-brown (2.5Y 5/6) mottles; moderate, coarse, angular blocky structure; very firm; shiny faces on all ped surfaces; neutral; clear, wavy boundary.

Cg—30 to 48 inches +, gray (10YR 6/1) silty clay; massive; very firm; calcareous.

The texture of the Ap horizon is uniformly silty clay, but the color is black (10YR 2/1) or very dark brown (10YR 2/2). The total thickness of the A horizons ranges from 10 to 16 inches. The thickness of the solum ranges from 24 to 40 inches but commonly is 26 to 30 inches. The texture of the C horizon is predominantly silty clay. Strata of silt or fine sand as much as 4 inches thick occur in the C horizon in some areas.

Morocco Series

The Morocco series consists of somewhat poorly drained soils that formed in strongly acid to very strongly acid sand. These soils formed under deciduous forest.

Morocco soils are in the catena that includes the excessively drained Plainfield, the moderately well drained Berrien, and the dark-colored, very poorly drained Newton soils. They are similar to Brady soils but have a finer textured B horizon and are calcareous at a depth of 42 to 66 inches. They differ from Aubbeenaubbee soils in that those soils have a finer textured B horizon and are underlain by loam till at a depth of 20 to 36 inches.

Profile of Morocco loamy fine sand in a cultivated field in SE¼NE¼ sec. 6, T. 31 N., R. 3 W.—

- Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loamy fine sand; weak, fine, granular structure; very friable; few fine roots; medium acid; abrupt, smooth boundary.
- A2—8 to 14 inches, pale-brown (10YR 6/3) sand; few, medium, distinct, yellowish-brown (10YR 5/8) mottles; single grain; loose; few dark grayish-brown (10YR 4/2) organic fillings; strongly acid; clear, wavy boundary.
- B21—14 to 19 inches, mottled pale-brown (10YR 6/3), gray (10YR 6/1), and reddish-yellow (7.5YR 6/8) sand; single grain; loose; strongly acid; clear, wavy boundary.
- B22—19 to 30 inches, mottled reddish-yellow (7.5YR 6/8), gray (10YR 6/1), and red (2.5YR 5/8) sand; single grain; loose; high iron content; strongly acid; clear, wavy boundary.
- C1—30 to 48 inches, very pale brown (10YR 7/3) fine sand; few, fine, distinct, yellow (10YR 7/6) mottles; single grain; loose; strongly acid; gradual, wavy boundary.
- C2g—48 to 58 inches, light-gray (10YR 7/2) sand; single grain; loose; very strongly acid; clear, wavy boundary.
- C3g—58 to 65 inches +, gray (10YR 6/1) sand; single grain; loose; medium acid.

The texture of the Ap horizon is uniformly loamy fine sand, but the color ranges from dark gray (10YR 4/1) to brown (10YR 5/3). The depth to mottling ranges from 6 to 15 inches. The color of the B horizon and the amount of iron in that horizon vary considerably. The reaction of the solum is commonly strongly acid, but it is medium acid in some areas.

Newton Series

The Newton series consists of very poorly drained soils that formed in strongly acid to very strongly acid sand. These soils formed under marsh grass.

Newton soils are in the catena that includes the excessively drained Plainfield, the moderately well drained Berrien, and the somewhat poorly drained Morocco soils. Newton and Maumee soils are similar, but Maumee soils formed in neutral to calcareous sand and have a less acid solum. Newton soils have a coarser textured Ap horizon than Gilford soils.

Profile of Newton loamy fine sand in a cultivated field in NE¼NW¼ sec. 24, T. 31 N., R. 4 W.—

- Ap—0 to 10 inches, black (10YR 2/1) loamy fine sand; weak, fine, granular structure; very friable; many fine roots; strongly acid; abrupt, smooth boundary.
- A12—10 to 13 inches, black (10YR 2/1) loamy fine sand; weak, fine, granular structure; very friable; few roots; strongly acid; abrupt, smooth boundary.
- A3—13 to 16 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; common, fine, distinct, strong-brown (7.5YR 5/8) mottles; weak, fine, granular structure; very friable; many black (10YR 2/1) organic fillings in root channels; strongly acid; clear, wavy boundary.
- C1g—16 to 25 inches, mottled light brownish-gray (10YR 6/2) and dark-gray (10YR 4/1) fine sand; single grain; loose; occasional thin lenses of sandy loam material up to 1/4 inch thick; strongly acid; clear, wavy boundary.
- C2g—25 to 33 inches, pale-brown (10YR 6/3) fine sand; single grain; loose; strongly acid; clear, wavy boundary.
- C3g—33 to 42 inches, mottled grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/8) sand; single grain; loose; some iron accumulation; strongly acid; clear, wavy boundary.
- C4g—42 to 54 inches +, grayish-brown (10YR 5/2) sand; single grain; loose; strongly acid.

The texture of the Ap horizon is uniformly loamy fine sand, but the color is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The total thickness of the A horizons ranges from 10 to 16 inches. Layers of sandy loam to sandy clay loam as much as 3 inches thick occur in the Cg horizon in some areas. The reaction of the Cg horizon is strongly acid or very strongly acid.

Odell Series

The Odell series consists of somewhat poorly drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 24 to 42 inches. These soils formed under prairie grass.

Odell soils are in the catena that includes the well-drained Parr and the moderately well drained Corwin soils. They occur with the very poorly drained Brookston soils. Odell soils differ from Darroch soils in that Darroch soils are underlain by stratified silt and fine sand.

Profile of Odell silt loam in a cultivated field in NW¼ NW¼ sec. 6, T. 29 N., R. 4 W.—

- Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; weak, medium, granular structure; friable; neutral; clear, smooth boundary.
- A12—8 to 11 inches, very dark brown (10YR 2/2) silt loam; weak, medium, granular structure; friable; slightly acid; clear, wavy boundary.
- A3—11 to 14 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.
- B21tg—14 to 17 inches, very dark grayish-brown (10YR 3/2) light clay loam; common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; firm; clay films on many ped surfaces; medium acid; clear, wavy boundary.
- B22tg—17 to 26 inches, dark grayish-brown (10YR 4/2) clay loam; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; clay films on many ped surfaces; slightly acid; clear, wavy boundary.
- C—26 to 40 inches +, yellowish-brown (10YR 5/4) loam till; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable; calcareous.

The texture of the surface layer is loam or silt loam, and the color is predominantly very dark brown (10YR 2/2). The depth to mottling ranges from 8 to 15 inches. The depth to calcareous till ranges from 24 to 42 inches, but it commonly is 24 to 30 inches. The texture of the till is predominantly loam.

Oshtemo Series

The Oshtemo series consists of well-drained soils that formed in sandy loam and loamy sand outwash, underlain by neutral to calcareous sand and gravel or stratified fine sand and silt at a depth of 42 to 70 inches or more. These soils formed under mixed deciduous forest.

Oshtemo soils are in the catena that includes the moderately well drained Bronson, the somewhat poorly drained Brady, and the very poorly drained Gilford soils.

Oshtemo soils differ from Fox soils in that Fox soils have a clay loam or gravelly clay loam B2 horizon that extends to the underlying calcareous sand and gravel. Also, Fox soils have calcareous sand and gravel at a depth of less than 42 inches. Oshtemo and Chelsea soils occur in close association, but Chelsea soils formed in strongly acid, deep sand containing thin, generally discontinuous bands of heavy loamy sand.

Profile of Oshtemo loamy sand in a cultivated field in NE¼NW¼ sec. 20, T. 30 N., R. 1 W.—

Ap—0 to 9 inches, dark-brown (10YR 3/3) loamy sand, light brownish gray (10YR 6/2) when dry; weak, medium and coarse, granular structure; very friable; many roots; neutral; abrupt, smooth boundary.

A21—9 to 20 inches, yellowish-brown (10YR 5/4) loamy sand; weak, medium to coarse, granular structure; very friable; many roots; dark-brown (10YR 3/3) organic fillings in old root channels; medium acid; gradual, wavy boundary.

A22—20 to 32 inches, yellowish-brown (10YR 5/6) loamy sand; very weak, coarse, subangular blocky structure; very friable; few roots; old root channels filled with Ap material extend to lower part of horizon; medium acid; clear, wavy boundary.

B21t—32 to 41 inches, dark yellowish-brown (10YR 4/4) gravelly loamy sand; weak, medium and coarse, subangular blocky structure; friable; many dark-brown (7.5YR 3/2) iron accumulations; thin clay flows around pebbles; medium acid; clear, wavy boundary.

B22t—41 to 49 inches, dark yellowish-brown (10YR 4/4) gravelly sandy loam; moderate, medium, subangular blocky structure; friable; many dark reddish-brown (5YR 2/2) iron stains; thin clay flows around pebbles; medium acid; clear, wavy boundary.

B23—49 to 55 inches, dark grayish-brown (10YR 4/2) gravelly loamy sand; moderate, medium, subangular blocky structure; friable; many dark reddish-brown (5YR 2/2) iron stains; thin clay flows around pebbles; neutral; clear, wavy boundary.

B3—55 to 58 inches, dark grayish-brown (2.5Y 4/2) gravelly sandy loam; weak, medium, subangular blocky structure; friable; many dark reddish-brown (5YR 2/2) iron stains; thin clay flows around pebbles; neutral; abrupt, irregular boundary.

C—58 to 65 inches +, dark grayish-brown (10YR 4/2) stratified sands and gravels of mixed lithology, including some shale; single grain; loose; calcareous.

The color of the Ap horizon ranges from very dark grayish brown (10YR 3/2) to brown (10YR 5/3). The reaction of this horizon ranges from neutral to strongly acid, depending upon the amount of lime that has been applied. The depth to the B2 horizon ranges from 24 to 48 inches or more. The B2 horizon ranges from dark yellowish brown (10YR 4/4) to dark brown (7.5YR 4/4) in color and from loamy sand to sandy clay loam in texture. The sandy clay loam is less than 10 inches thick. Thin, commonly discontinuous layers of dark-brown (7.5YR 4/4) or yellowish-brown (10YR 5/6) loamy fine sand occur above the B2 horizon where Oshtemo soils grade to Chelsea soils. The texture of the C horizon ranges from medium and coarse sand with a small amount of fine gravel to stratified fine sand and silt.

Parr Series

The Parr series consists of well-drained soils that formed in light clay loam to loam till of Wisconsin age. The till is highly calcareous at a depth of 30 to 42 inches. These soils formed under prairie grass.

Parr soils are in the catena that includes the moderately well drained Corwin and the somewhat poorly drained Odell soils. They occur with the very poorly drained Brookston soils. They occur also with Ayr soils but differ from them in that Ayr soils formed in 20 to 36 inches of sandy loam material over weathered loam till.

Profile of Parr loam in a cultivated field in SE¼NE¼ sec. 5, T. 29 N., R. 4 W.—

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; friable; strongly acid; clear, smooth boundary.

A12—9 to 13 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; friable; strongly acid; clear, wavy boundary.

A3—13 to 17 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium, granular structure; friable; strongly acid; clear, wavy boundary.

B1—17 to 24 inches, dark-brown (7.5YR 4/4) heavy loam; weak, medium, subangular blocky structure; friable; few very dark grayish-brown (10YR 3/2) organic fillings; medium acid; clear, wavy boundary.

B2t—24 to 33 inches, dark-brown (7.5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thin clay films on ped surfaces; slightly acid; clear, wavy boundary.

C—33 to 42 inches +, yellowish-brown (10YR 5/4) loam till; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; massive; friable; calcareous.

The texture of the A horizon is uniformly loam, but the color is very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2). The color of the B horizon is yellowish brown (10YR 5/4) to dark brown (7.5YR 4/4). The depth to calcareous till ranges from 30 to 42 inches. In the deeper, leached soils, the depth to calcareous till increases with a corresponding increase in the thickness of the B horizon. The texture of the till is predominantly loam. Limestone bedrock occurs at a depth of 24 to 42 inches in small areas around Francesville.

Plainfield Series

The Plainfield series consists of excessively drained soils that formed in strongly acid and very strongly acid sand. These soils formed under deciduous forest.

Plainfield soils are in the catena that includes the moderately well drained Berrien, the somewhat poorly drained Morocco, and the dark-colored, very poorly drained Newton soils. Plainfield and Chelsea soils are similar, but Plainfield soils have thin, discontinuous textural horizons at a depth of less than 60 inches.

Profile of Plainfield fine sand in a forested area in NW¼NW¼ sec. 3, T. 30 N., R. 1 W.—

O1—1 inch to 0, partially decomposed leaves and organic matter.

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) fine sand; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.

A2—4 to 8 inches, yellowish-brown (10YR 5/4) fine sand; single grain; loose; very strongly acid; clear, smooth boundary.

B—8 to 26 inches, yellowish-brown (10YR 5/6) fine sand; color grades to a brownish yellow (10YR 6/6) in lower part of horizon; single grain; loose; very strongly acid; gradual, smooth boundary.

C—26 to 60 inches +, yellow (10YR 7/6) fine sand; single grain; loose; very strongly acid.

The texture of the Ap horizon is uniformly fine sand. It is 6 to 8 inches thick and is dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4). The color of the B horizon is yellowish brown (10YR 5/6) to strong brown (7.5YR 5/6), and that of the C horizon is yellow (10YR 7/6) to light yellowish brown (10YR 6/4). Thin, discontinuous textural bands commonly occur below a depth of 60 inches where Plainfield soils grade to Chelsea soils.

Rensselaer Series

The Rensselaer series consists of very poorly drained soils that formed in lacustrine deposits of stratified calcareous silt and fine sand. These soils formed under prairie grass.

Rensselaer soils are in the catena that includes the moderately well drained Foresman and the somewhat poorly drained Darroch soils.

Rensselaer soils have a coarser textured solum and substratum than the Montgomery soils, which formed in lacustrine silty clay and clay. They have a finer textured solum than Gilford soils. They differ from Brookston soils in that those soils formed in loam to light clay and loam till.

Profile of Rensselaer silt loam in a cultivated field in SW¼SW¼ sec. 32, T. 30 N., R. 4 W.—

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

A12—9 to 12 inches, black (10YR 2/1) heavy silt loam; weak, medium, subangular blocky structure; friable; slightly acid; clear, smooth boundary.

B21tg—12 to 16 inches, grayish-brown (2.5Y 5/2) and light olive-brown (2.5Y 5/4) silty clay loam; common, fine, distinct, light olive-brown (2.5Y 5/6) mottles; moderate, medium, subangular blocky structure; firm; many black (10YR 2/1) organic fillings in root channels; thick clay films on ped surfaces; slightly acid; clear, wavy boundary.

IIB22tg—16 to 30 inches, grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; firm; many very dark gray (10YR 3/1) organic fillings in root channels; thin clay films on many ped surfaces; neutral; clear, wavy boundary

IIIC1g—30 to 34 inches, light-gray (10YR 7/1) very fine sand; many, medium, distinct, brownish-yellow (10YR 6/6) mottles; weak, coarse, subangular blocky structure; very friable; calcareous; abrupt, wavy boundary.

IIIC2g—34 to 40 inches, gray (10YR 6/1) to light-gray (10YR 7/1) silt; many, coarse, distinct, brownish-yellow (10YR 6/6) mottles; massive; friable; calcareous; abrupt, smooth boundary.

IIIC3—40 to 60 inches +, yellowish-brown (10YR 5/6) silt; thin strata of very fine sand; many, coarse, distinct, light-gray (10YR 7/1) mottles; massive; friable; calcareous.

The texture of the Ap horizon is loam or silt loam, and the color is black (10YR 2/1) to very dark gray (10YR 3/1). The A horizons range from 12 to 18 inches in thickness. The thickness of the solum ranges from 24 to 42 inches. The B2 horizon is sandy clay loam to silty clay loam. The texture and sequence of the underlying strata vary within short distances, although the texture is predominantly silt and fine sand. Thin strata of coarse sand or silty clay occur in the C horizon in some areas. Loam till occurs at a depth of 42 to 60 inches or more in some areas.

Seward Series

The Seward series consists of moderately well drained, weakly developed soils that formed in 20 to 42 inches of sand and loamy sand over heavy clay loam to silty clay. These soils formed under deciduous hardwood forest.

Seward soils have a finer textured C horizon than Metea soils. They differ from Berrien soils in that Berrien soils formed in deep acid sand and lack the fine-textured underlying material.

Profile of Seward loamy fine sand in a cultivated field in SE¼SW¼ sec. 31, T. 31 N., R. 4 W.—

Ap—0 to 10 inches, dark grayish-brown (2.5Y 4/2) loamy fine sand; weak, medium, granular structure; very friable; few iron stains along root channels in lower part of horizon; slightly acid; abrupt, smooth boundary.

A21—10 to 20 inches, light yellowish-brown (10YR 6/4) fine sand; single grain; loose; very dark gray (10YR 3/1) organic fillings in root channels; medium acid; clear, smooth boundary.

A22—20 to 30 inches, dark-brown (7.5YR 4/4) fine sand; few, fine, distinct, light yellowish-brown (10YR 6/4), brownish-yellow (10YR 6/6), and very pale brown (10YR 7/4) mottles; single grain; loose; many iron stains; medium acid; abrupt, smooth boundary.

IIBt—30 to 42 inches, mottled strong-brown (7.5YR 5/8) and gray (N 5/0) silty clay; moderate, coarse, angular blocky structure; very firm; strong-brown (7.5YR 5/6) iron stains are common; thin gray (N 5/0) clay films on many ped surfaces; slightly acid; abrupt, smooth boundary.

IICg—42 to 46 inches +, gray (5Y 5/1) to light-gray (5Y 6/1) silty clay; massive; very firm; calcareous.

The texture of the Ap horizon is uniformly loamy fine sand, but the color is dark grayish brown (2.5Y 4/2) to grayish brown (10YR 5/2). The depth to mottling ranges from 18 to 30 inches. The thickness of the sandy overburden ranges from 20 to 42 inches, but it is commonly 20 to 30 inches. The texture of the C horizon is predominantly silty clay.

Sloan Series

The Sloan series consists of very poorly drained soils that formed in medium-textured alluvium derived from highly calcareous drift of Wisconsin age. Sloan soils have a weakly developed B horizon.

These soils are in the catena that includes the moderately well drained Eel soils.

Profile of Sloan silt loam, calcareous variant, in a cultivated field in NE¼SE¼ sec. 30, T. 30 N., R. 1 W.—

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; friable; calcareous; abrupt, smooth boundary.

A12—8 to 20 inches, very dark gray (N 3/0) silt loam; common, medium, distinct, dark reddish-brown (2.5YR 3/4) iron stains; moderate, medium, subangular blocky structure; firm; calcareous; gradual, smooth boundary.

Bg—20 to 30 inches +, very dark gray (10YR 3/1) silt loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; thin lenses of sand up to 1 inch thick occur throughout the horizon; calcareous.

The texture of the surface layer is predominantly silt loam, although there is a considerable acreage of loam. The color of the Ap horizon grades to black (10YR 2/1) in some areas. The reaction of the Ap horizon ranges from slightly acid to calcareous. The structure of the Bg horizon varies, and it grades to massive in some areas. Glacial till occurs at a depth of 36 inches or more in some areas.

Strole Series

The Strole series consists of somewhat poorly drained soils that formed in lacustrine deposits of calcareous silty clay and clay. These soils formed under prairie grass vegetation.

Strole soils are closely associated with the very poorly drained Montgomery soils. They have a finer textured solum and substratum than Darroch soils. They differ from Odell soils in that those soils formed in loam till and have a coarser textured solum.

Profile of Strole silt loam in a cultivated field in NE¼NE¼ sec. 9, T. 29 N., R. 4 W.—

Ap—0 to 9 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; friable; neutral; clear, smooth boundary.

A3—9 to 14 inches, dark-brown (10YR 3/3) light silty clay loam; many, fine, faint, dark yellowish-brown (10YR 4/4) mottles; moderate, fine, granular structure; friable; neutral; gradual, wavy boundary.

B21t—14 to 24 inches, yellowish-brown (10YR 5/4) silty clay; many, medium, faint, grayish-brown (10YR 5/2) mottles; moderate, medium, subangular blocky structure; firm; thick clay films on ped surfaces; neutral; clear, smooth boundary.

B3—24 to 29 inches, yellowish-brown (10YR 5/6) silty clay; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, angular blocky structure; very firm; calcareous; diffuse, wavy boundary.

C—29 to 40 inches +, yellowish-brown (10YR 5/4) silty clay; many, coarse, prominent, light brownish-gray (10YR 6/2) mottles; massive; very firm; calcareous.

The texture of the Ap horizon is uniformly silt loam, and the color is predominantly very dark brown (10YR 2/2). The total thickness of the A horizons ranges from 12 to 15 inches. The depth to mottling ranges from 8 to 14 inches. The thickness of the solum ranges from 24 to 40 inches but generally is 24 to 30 inches. The C horizon is predominantly silty clay, but in some areas it contains thin strata of fine sand or silt as much as 4 inches thick.

Tawas Series

The Tawas series consists of organic soils that formed in decomposed woody and sedgy plants. The organic layer ranges from 12 to 42 inches in thickness and is underlain by sand and loamy sand.

Tawas soils differ from Edwards soils in that Edwards soils are underlain by marl. They differ from Carlisle soils in that those soils formed in organic deposits more than 42 inches thick.

Profile of Tawas muck in a cultivated field in NW¼ NW¼ sec. 35, T. 29 N., R. 2 W.—

Ap—0 to 8 inches, black (N 2/0) muck; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

2—8 to 18 inches, black (N 2/0) muck with dark-brown (7.5YR 4/4), partly decomposed woody fragments; moderate, coarse, subangular blocky structure; friable; neutral; clear, wavy boundary.

3—18 to 21 inches, black (10YR 2/1) and dark-brown (7.5YR 4/4) muck; many, medium, distinct, pale-brown (10YR 6/3) and pale-olive (5Y 6/4) mottles and streaks of sand; weak to moderate, coarse, subangular blocky structure; friable; neutral; clear, smooth boundary.

IIC1—21 to 32 inches, pale-brown (10YR 6/3), light-gray (10YR 7/2), and very pale brown (10YR 7/3) medium to fine sand; common, medium, distinct, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/4) mottles and streaks in layered sand; single grain; loose; alkaline; abrupt, smooth boundary.

IIC2g—32 to 42 inches +, light-gray (10YR 7/1) and gray (10YR 6/1) medium and fine sand; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; single grain; loose; calcareous.

The thickness of the organic layer ranges from 12 to 42 inches but is commonly 18 to 30 inches. The reaction of the organic layer is medium acid to neutral. The texture of the underlying mineral material ranges from sand to loamy fine sand, but sand is the dominant texture.

Wallkill Series

The Wallkill series consists of very poorly drained soils forming in 10 to 40 inches of recent alluvium over muck or peat. The alluvium is of Wisconsin drift origin.

Wallkill soils differ from Washtenaw soils in that Washtenaw soils are forming in 10 to 40 inches of recent alluvium over dark-colored mineral soil.

Profile of Wallkill silt loam in a cultivated field in NW¼SE¼ sec. 7, T. 29 N., R. 1 W.—

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; friable; medium acid; abrupt, smooth boundary.

A12—8 to 13 inches, very dark gray (10YR 3/1) silt loam; coarse, subangular blocky structure; firm; medium acid; clear, smooth boundary.

A13—13 to 20 inches, black (10YR 2/1) heavy silt loam; moderate, coarse, subangular blocky structure; firm; strongly acid; abrupt, smooth boundary.

IIC1—20 to 31 inches, black (10YR 2/1) muck; weak, coarse, granular structure; friable; medium acid; clear, smooth boundary.

IIC2—31 to 45 inches, black (10YR 2/1) muck and olive-brown (2.5Y 4/4) peat; moderate, thin, platy structure; friable; medium acid; clear, smooth boundary.

IIC3—45 to 50 inches +, dark-brown (7.5YR 3/2) peat; massive; friable; mildly alkaline.

The recent alluvium is dominantly silt loam in texture and very dark gray (10YR 3/1) to dark grayish brown (10YR 4/2) in color. The thickness of the recent alluvium ranges from 10 to 40 inches but averages between 16 and 28 inches.

Washtenaw Series

The Washtenaw series consists of very poorly drained soils that are forming in 10 to 40 inches of recent, light-colored alluvium over dark-colored, depressional soils on uplands or in outwash areas.

Washtenaw soils differ from Wallkill soils in that Wallkill soils are forming over mineral soil rather than muck or peat. They differ from Brookston and Rensselaer soils in that those soils have no alluvium or only a slight amount of it over the original A horizon.

Profile of Washtenaw silt loam in a meadow in SE¼ sec. 13, T. 31 N., R. 1 W.—

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, coarse, subangular blocky structure; friable; neutral; clear, smooth boundary.

C1—6 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, coarse, subangular blocky structure; friable; black (10YR 2/1) organic fillings in root channels; neutral; clear, smooth boundary.

C2—12 to 22 inches, dark-gray (10YR 4/1) silt loam; common, fine, distinct, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) mottles; moderate, medium, coarse, subangular blocky structure; friable to slightly firm; grayish-brown (10YR 5/2) silt fillings in cracks; neutral; clear, wavy boundary.

IIB21b—22 to 33 inches, black (N 2/0) silty clay; moderate, coarse, prismatic structure that breaks to strong, coarse, angular blocky structure; very firm; dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) fillings in cracks and crayfish holes; thin clay films on ped faces; neutral; clear, smooth boundary.

IIB22b—33 to 44 inches, black (N 2/0) heavy silty clay loam; few, medium, distinct, dark-olive (5Y 3/3) mottles; moderate, medium, coarse, subangular blocky structure; firm; thin clay films on ped faces; grayish-brown (10YR 5/2) silt fillings in cracks and root channels; neutral; clear, smooth boundary.

IIB23b—44 to 58 inches, mottled light olive-gray (5Y 6/2) and yellowish-brown (10YR 5/8) gritty silty clay loam; weak, medium, subangular blocky structure; slightly firm; few thin clay films; very dark gray (5Y 3/1) organic fillings; neutral; clear, smooth boundary.

IIB3b—58 to 65 inches, mottled light olive-brown (2.5Y 5/4), gray (N 6/0), and light-gray (2.5Y 7/2) light clay loam; weak, medium, subangular blocky structure; slightly firm; neutral; clear, smooth boundary.

IIC1—65 to 70 inches +, mottled light olive-brown (2.5Y 5/4), gray (N 6/0), and light brownish-gray (2.5Y 6/2) loam till; weak, thick, platy structure to massive; friable; few shale fragments and limestone pebbles; calcareous.

The dominant texture of the Ap horizon is silt loam, and the color is very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2). The thickness of the recent alluvium ranges from 10 to 40 inches, but the average thickness is about 24 inches. The underlying material consists of loam to silty clay loam till or stratified silt and sand.

Westland Series

The Westland series consists of very poorly drained soils that formed in loam outwash material 24 to 42 inches thick over calcareous sand and gravel. These soils formed under marsh grass.

Westland soils are in the catena that includes the well-drained Fox soils. They occur with Gilford soils, but differ in that Gilford soils have a coarser textured Bg horizon and are underlain by calcareous sand and gravel at a depth greater than 42 inches.

Profile of Westland silt loam, moderately deep, in a cultivated field in SW¼SW¼ sec. 26, T. 29 N., R. 1 W.—

Ap—0 to 7 inches, black (10YR 2/1) heavy silt loam; moderate, medium, granular structure; friable; many fibrous grass roots; neutral; abrupt, smooth boundary.

A12—7 to 12 inches, black (10YR 2/1) heavy silt loam; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

B21tg—12 to 16 inches, very dark gray (5Y 3/1) silty clay loam; few, fine, faint, dark grayish-brown (2.5Y 4/2) mottles; moderate, medium, subangular blocky structure; firm; clay films on many ped surfaces; neutral; clear, wavy boundary.

B22tg—16 to 26 inches, olive-gray (5Y 4/2) sandy clay loam; common, fine, distinct, gray (5Y 6/1) and dark-brown (7.5YR 4/4) mottles; moderate, medium, subangular blocky structure; firm; clay films on many ped surfaces; slightly acid; clear, wavy boundary.

B23tg—26 to 32 inches, dark grayish-brown (2.5Y 4/2) gravelly sandy clay loam; common, fine, distinct, dark-brown (7.5YR 4/4) mottles; moderate, coarse, subangular blocky structure; firm; slightly acid; abrupt, irregular boundary.

IIC1—32 to 39 inches, light-gray (10YR 7/2) sand; 5 percent fine gravel; single grain; loose; mildly alkaline; clear, irregular boundary.

IIC2—39 to 45 inches +, light-gray (10YR 7/2) sand and gravel; single grain; loose; calcareous.

The texture of the surface layer is loam or silt loam. The color of the Ap horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The total thickness of the A horizons ranges from 10 to 16 inches. The texture of the B2 horizon ranges from sandy clay loam to silty clay loam. The thickness of the solum is 30 to 42 inches. Soft "bog iron" has accumulated in the solum in some areas. The quantity of gravel in the C horizon varies, but it commonly is 5 to 15 percent or more by volume.

General Nature of the County

In the late 1820's, when the southern part of the State already had thriving communities, the area that includes Pulaski County was shown on maps as "Indian Lands." The Potawatomi Indians ceded their interest in these lands to the United States by treaty in 1832. In 1835 the Indiana State Legislature authorized the establishment of Pulaski County, and 4 years later the population had increased sufficiently to permit organization of the county. The population increased to a peak of 14,033 in 1900, then declined but again increased, and in 1960 was 12,837.

Transportation, Utilities, and Industry

Four railroads, two Federal highways, and two State highways serve the county, as shown on the general soil map at the back of this publication. In addition, there are 800 miles of surfaced county roads. Bus transportation and truck freight service are supplied regularly.

Electric power and telephone service are provided throughout the county, and natural gas is available to some communities and rural homes.

Electrical controls, flat-leaf springs, and steel tubing are among the products manufactured in the county, and in addition, there are garment factories. A crushed stone plant and a tile factory, both at Francesville, make use of the limestone and clay in the county.

Farming

Farming is the primary source of income in Pulaski County. Land for cultivation ranges from low-yielding sandhills to highly productive areas. Thousands of acres of drained swampland are now in production, notably the "Blue Sea" area of Rich Grove and Cass Townships in the northwestern part of the county.

Improved drainage, increased use of fertilizer, and adaptation of muck soil to cultivation have contributed much to the agricultural economy.

Corn, soybeans, wheat, and oats are the principal crops. Potatoes and onions are grown in sizable quantities in the northern part of the county. Mint is grown in the northwestern part of the county. This is one of the few areas where mint is grown as a crop in the United States. Sweet corn and popcorn also are grown, but the acreage is small. Table 8 shows the acreage of principal crops in stated years. This table and table 9, contain data from the U.S. Census of Agriculture.

The number of livestock on farms is shown in table 9. Although the total number of cattle fluctuated during the period from 1945 to 1959, the number of dairy cattle steadily decreased. The number of hogs more than doubled during that period, and income from hogs sold alive in 1959 was nearly 20 percent of the total farm income.

TABLE 8.—*Acreage of principal crops in stated years*

Crops	1945	1950	1954	1959
	Acres	*Acres*	*Acres*	*Acres*
Corn	67, 568	70, 202	71, 199	84, 217
Soybeans	42, 211	33, 685	47, 683	58, 456
Oats	12, 881	18, 319	13, 645	7, 305
Wheat	9, 358	18, 147	15, 277	14, 278
Hay	11, 775	12, 129	13, 778	9, 367
Rye (grain harvested)	2, 871	3, 216	2, 933	3, 399

TABLE 9.—*Livestock of all ages on farms*

Livestock	1945	1950	1954	1959
Horses and mules	2, 265	587	201	194
All cattle	23, 573	19, 237	22, 388	16, 790
Milk cows	8, 166	7, 138	5, 980	3, 763
Beef	4, 710	5, 540	5, 295	3, 940
Hogs and pigs	27, 045	39, 755	45, 620	58, 495
Sheep and lambs	2, 204	1, 582	2, 370	2, 765
Chickens	183, 749	152, 670	202, 904	195, 086

During the period from 1945 to 1959, farms of all types, except cash-grain, decreased in number. Dairy farms decreased from 120 to 80; livestock farms from 390 to 290; and poultry farms from 120 to 50. Cash-grain farms increased from 441 to 548.

Between 1945 and 1959, the total number of farms in the county decreased from 1,538 to 1,333, and the average size of farms increased from 166.3 acres to 189.5 acres. There were 1,019 commercial farms in the county in 1959, and the average size was 212.2 acres.

Climate [4]

The temperature in Pulaski County varies widely from summer to winter, but precipitation is fairly consistent through the seasons, compared with that in other parts of the United States. Most months in winter have about 2 inches of precipitation, and most months in spring and early in summer have about 4 inches. A drought is most likely to be damaging in midsummer when evaporation losses are high, soil moisture is low, and showers are local rather than general. Table 10 shows some probabilities for low or high monthly rainfall. In July, for example, rainfall for 1 year in 10 is less than 1 inch or is more than 5.6 inches.

The climate is influenced a little by Lake Michigan. Severe low temperatures are diminished somewhat. Some cloudiness and showers in winter and early in spring are related to winds from Lake Michigan, but the amount of snowfall is not affected. The average snowfall is between 5 and 6 inches a month in winter. For winter grain, this can be a protection from the subzero temperatures that are probable. Snow cover also minimizes the depth of frost in soil. Frost may penetrate to a depth of 3 or 4 feet in some winters.

The average growing season, or period between the last 32° temperature in spring and the first in fall, is 161 days. In 25 percent of the years, the growing season is less than 150 days or more than 172 days. In 10 percent of the years, it is less than 140 days or more than 182 days.

The probabilities of the last occurrence of specified temperatures in spring and the first in fall are shown in table 11. For this data, official temperatures are taken from thermometers placed in a standard thermometer shelter about 5 feet above grass. Since temperatures on a windless and cloudless night are often lower below the shelter or in a crop, some probabilities are shown for in-shelter temperatures that are above freezing. For example, an in-shelter temperature of 40° F. often is accompanied by frost damage to crops on low muck soils (*6*).

Relative humidity and other meteorological elements are not measured in the county, but certain information can be derived from the climatology of the area. Relative humidity often reaches nearly 100 percent at the time of the daily lowest temperature, usually just before sunrise or when there is fog. If this point is reached for a period of time during the night, heavy dew or frost accumulates. While this may delay some early morning farming operations, it also may be a welcome source of moisture and may slow down the loss of soil moisture. Relative humidity declines as the day warms. A relative humidity of 40 or 50 percent is common on a sunny day. Generally, after the passing of a cold front, the humidity is lower. South winds bring higher humidity than winds from other directions.

Winds of high velocity seldom occur in the county. They are caused by an intense low-pressure center, which may move through the area in the form of a severe thunderstorm or tornado. Scattered thunderstorms account for the irregular precipitation in summer. Tornadoes are so small and infrequent that property loss and casualties from them are seldom encountered. Only four tornadoes have been reported in a 48-year period. Surface winds generally blow from the southern quadrant, except during a couple of winter months when they blow from the north.

Differences in climate in the county exist, depending on direction of slopes, elevation of terrain, and location of streams, and to some extent on soil moisture, soil color, and vegetation. These should be considered if micro-comparisons of climate are made within the county and the Winamac station is used as the "benchmark" station.

[4] Prepared by LAWRENCE A. SCHAAL, State climatologist, U.S. Dept. of Commerce, Agronomy Dept., Purdue Univ.

TABLE 10.—*Temperature and precipitation*

[All data from Winamac weather station, 1934–63 unless otherwise stated]

Month	Temperature							Precipitation					Average number of days with—				
											Snow or sleet			Temperature			
														Maximum		Minimum	
	Lowest on record	Average monthly minimum	Average daily minimum	Monthly average	Average daily maximum	Average monthly maximum	Highest on record	1 year in 10 will have less than[1]—	Average	1 year in 10 will have more than[1]—	Average	Maximum monthly	Precipitation of 0.1 inch or more	90° and above	32° and below	32° and below	0° and below
	°F.	°F.	°F.	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*	*Days*	*Days*	*Days*	*Days*	*Days*
January	−24	−1	18	26	35	54	69	0.6	2.1	3.5	5.4	15	4	0	12	28	3
February	−19	−3	19	29	38	56	70	.5	1.9	3.2	5.7	16	5	0	8	26	2
March	−9	10	28	38	48	71	82	1.1	2.7	4.7	3.3	16	6	0	4	23	(2)
April	15	23	38	50	61	81	90	1.3	3.8	6.1	1.1	10	8	(2)	0	10	0
May	24	32	48	60	72	88	93	1.2	3.9	6.7	(2)	1	7	1	0	2	0
June	32	42	58	70	82	94	104	1.5	4.6	6.8	0	0	7	6	0	(2)	0
July	41	48	62	74	86	96	109	1.0	3.4	5.6	0	0	8	9	0	0	0
August	39	46	60	72	84	95	103	1.4	3.6	6.2	0	0	6	7	0	0	0
September	26	35	53	65	78	92	101	.9	3.3	6.1	(2)	(2)	5	4	0	(2)	0
October	18	26	42	54	67	83	90	.6	3.0	6.0	(2)	1	6	(2)	0	5	0
November	−10	12	30	40	50	71	82	1.3	2.6	4.5	2.0	8	5	0	2	19	(2)
December	−17	−3	21	29	37	57	65	.5	1.8	4.5	5.8	17	4	0	10	28	3
Year	−24	22	40	51	61	78	109	28.7	36.7	43.0	23.3	17	71	27	36	141	8

[1] From data covering the period 1913 to 1963.
[2] Slightly more than zero.

TABLE 11.—*Probability of specified temperatures in spring and fall*

[Based on data from the Winamac weather station; the 50 percent probabilities are also the average dates on which the specified temperatures occur]

Temperature	Probability in percent									
	Chance of occurring after specified dates in spring					Chance of occurring before specified dates in fall				
	90	75	50	25	10	10	25	50	75	90
°*F.*										
40	May 8	May 16	May 24	June 1	June 9	Sept. 13	Sept. 19	Sept. 25	Oct. 1	Oct. 7
36	Apr. 29	May 7	May 15	May 23	May 31	Sept. 18	Sept. 25	Oct. 3	Oct. 11	Oct. 18
32	Apr. 20	Apr. 27	May 4	May 11	May 18	Sept. 27	Oct. 4	Oct. 12	Oct. 20	Oct. 27
28	Apr. 3	Apr. 10	Apr. 18	Apr. 26	May 3	Oct. 17	Oct. 23	Oct. 30	Nov. 6	Nov. 12
24	Mar. 16	Mar. 25	Apr. 3	Apr. 12	Apr. 21	Oct. 23	Oct. 29	Nov. 5	Nov. 12	Nov. 18
20	Mar. 4	Mar. 13	Mar. 22	Mar. 31	Apr. 9	Oct. 31	Nov. 9	Nov. 19	Nov. 29	Dec. 8
16	Feb. 25	Mar. 4	Mar. 12	Mar. 20	Mar. 27	Nov. 11	Nov. 20	Nov. 29	Dec. 8	Dec. 17

Geology [5]

Nebraskan glacial deposits have not been identified in Indiana, but glacial deposits of the Kansan and Illinoian stages, which came later, are in south-central Indiana and probably also occur along the deeply buried Tertiary and Quaternary bedrock valleys in Pulaski and adjoining counties. Later, as ice advanced in the early Wisconsin stage, a coalesced ice sheet (Lake Michigan-Erie) again covered the county and obliterated the land sculpture of the earlier glaciation.

The morainic relationships in Pulaski and adjacent counties are obscure. Most of the surficial glacial deposits of the county were probably laid down by ice that came from the northeast—the Saginaw lobe or its coalesced counterpart. The maximum advance of this ice sheet is not marked by a well-defined end moraine. Any one of three possible movements of ice could have produced the topographic features of this area. After retreating into the Michigan Basin, the ice could have readvanced to the position of the Marseilles moraine and thus buried the northern extensions of the older moraines produced by the Saginaw lobe. Ice could have moved from the northwest and northeast at the same time, and the ice from the northeast could have partly overridden the Michigan lobe ice. After the ice from the Michigan lobe retreated from the Marseilles moraine, a thin sheet of ice from the northeast could have overridden the eastern part of the Marseilles moraine.

Of these three hypotheses, the third seems the most reasonable. The extent of the thin ice from the Saginaw lobe is evidenced by long, arcuate channels and belts of kettles and by intervening dune-covered or submorainic rises. These rises trend northwest-southeast and are prominently reflected in the drainage pattern of the county. At its maximum extent, the glacier appears to have overridden and truncated the Marseilles moraine in the eastern part of Jasper County.

As the ice retreated to the northeast, a broad depression southeast of Medaryville was flooded by melt water. The overflow from the lake drained along the present course of Big Monon Creek and into the lower reaches of the Tippecanoe River in White County. Before the lake was completely drained, about 15 feet of lake silt and clay was deposited in the central part of the basin. Little outwash is interbedded with, or overlies, the lake sediments.

No long stands of the ice seem to have occurred in the county. The positions of many temporary stands, however, are marked by ice marginal trenches and by strings of depressions from melting ice blocks. Melt water drained away from the ice through these channels. As the buried ice blocks melted, drainage in many channels was interrupted until man tiled and ditched this area. As the ice retreated, melt water spread broad sheets of sand and gravel in the form of outwash plains over the central part of the county. The northwesterly winds whipped some of the outwash plain sands into parabolic and longitudinal dunes, a few of which have become active again since the land has been cleared by man. The presence of peat under dune sands suggests that vegetation once grew in several of the ice block depressions.

The Tippecanoe River in Pulaski County lengthened its course headward as the ice withdrew. The course of the river consists of segments that were once ice-marginal drainageways or transverse streams across submorainic rises. The southwest-northeast segments of the river flow in linear lows that are parallel to the direction of ice movement.

The postglacial interval in Pulaski County has been marked by the continued wind-drifting of outwash sand and dune sand, by the accumulation of peat and marl in poorly drained or open-water depressions, by the deposition of alluvium along the Tippecanoe River and its major tributaries, and by the natural or artificial reintegration of lesser drainageways. Most of the sand dunes have been stabilized by vegetation.

[5] Prepared by GERALD H. JOHNSON, Department of Geology, Indiana University.

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Glossary

Acidity. See Reaction, soil.

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point. Commonly expressed as inches of water per inch of depth of soil.

Blowout. An excavation produced by wind action in loose soil, usually sand.

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

Catena, soil. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

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

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

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle to moderate 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; tends to stretch somewhat and pull apart, rather than 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 and brittle; little affected by moistening.

Controlled water table practices. Maintaining the water table at a desirable level during the growing season. The water table is lowered or raised through a drainage system of open ditches, tile lines, or a combination of the two, in which simple control structures are installed.

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

Drainage, soil. The relative rapidity and extent of removal of water, under natural conditions, from the surface and within the soil. Terms commonly used to describe drainage are as follows:

Very poorly drained.—Water is removed so slowly that the soil remains wet most of the time, and water ponds on the surface frequently. The water table is at the surface most of the time.

Poorly drained.—Water is removed so slowly that the soil remains wet for much of the time. The water table is at or near the surface during a considerable part of the year.

Somewhat poorly drained.—Water is removed so slowly that the soil is wet for significant periods but not all the time.

Moderately well drained.—Water is removed somewhat slowly and the soil is wet for a small but significant part of the time.

Well drained.—Water is removed readily but not rapidly.

Somewhat excessively drained.—Water is removed so rapidly that only a small part is available to plants. Only a narrow range of crops can be grown, and yields are usually low unless the soil is irrigated.

Excessively drained.—Water is removed very rapidly. Enough precipitation commonly is lost to make the soil unsuitable for ordinary crops.

Drift (geology). Rock and earth material transported by ice sheets. Unsorted drift consists of sand, clay, silt, and boulders and is called glacial till.

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 in the form of kames, eskers, deltas, and outwash plains.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile. These are the major soil horizons:

O horizon.—Organic horizon of mineral soils.

A horizon.—The mineral horizon at the surface. It contains an accumulation of organic matter, has been leached of soluble minerals and clay, or shows the effects of both.

B horizon.—The horizon that contains an accumulation of clay minerals or other materials, that has developed a characteristic structure, or that shows the evidences of both.

C horizon.—The unconsolidated material immediately under the true soil. In chemical, physical, and mineral composition it is presumed to be similar to the material from which at least part of the overlying solum has developed, unless the C designation is preceded by a Roman numeral.

R horizon.—Rock underlying the C horizon, or the B horizons if no C horizon is present.

Roman numerals are prefixed to the master horizon or layer designations (O, A, B, C, R) to indicate lithologic discontinuities either within or below the solum. The first, or uppermost, material is not numbered, for the Roman numeral I is understood; the second, or contrasting, material is numbered II, and others are numbered III, IV, and so on, consecutively downward. Thus, a sequence from the surface downward might be A2, B1, IIB2, IIB3, IIC1, IIIC2.

In this report the following symbols are used with the letters that designate the master horizons: g—strong gleying; p—plow layer; t—illuvial clay.

Intercrop. A crop seeded with a small grain and plowed under the following spring as green manure.

Lacustrine deposit (geology). Material deposited in lake water and exposed by lowering of the water level or elevation of the land.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. The types of moraines are terminal, lateral, medial, and ground.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, chemical, mineralogical, and biological properties of the various horizons that make up the soil profile.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Native vegetation. The vegetation under which the soil formed.

Outwash, glacial. Cross-bedded gravel, sand, and silt deposited by melt water as it flowed from glacial ice.

Parent material, soil. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Peat. Unconsolidated soil material, mostly undecomposed organic matter, that has accumulated in areas of excess moisture.

Permeability, soil. The quality of a soil that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH. See Reaction, soil.

Plow layer. The soil ordinarily moved in tillage; equivalent to surface soil.

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

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction, because it is neither acid nor alkaline. Degrees of acidity or alkalinity are expressed as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7. 4 to 7. 8
Very strongly acid	4. 5 to 5. 0	Moderately alkaline	7. 9 to 8. 4
Strongly acid	5. 1 to 5. 5	Strongly alkaline	8. 5 to 9. 0
Medium acid	5. 6 to 6. 0	Very strongly alkaline	9. 1 and higher
Slightly acid	6. 1 to 6. 5		
Neutral	6. 6 to 7. 3		

Sand. As a soil separate, individual rock or mineral fragments having a diameter ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. As a textural class, any soil that contains 85 percent or more sand and not more than 10 percent clay.

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 textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Solum, soil. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological 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 clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subirrigation. Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer beneath the solum or true soil; the C or D horizon.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. It includes the A horizon and part of the B horizon; has no depth limit.

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

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. (See also Clay, Sand, and Silt.) The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided into coarse, fine, or very fine.

Till (or glacial till). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

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

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