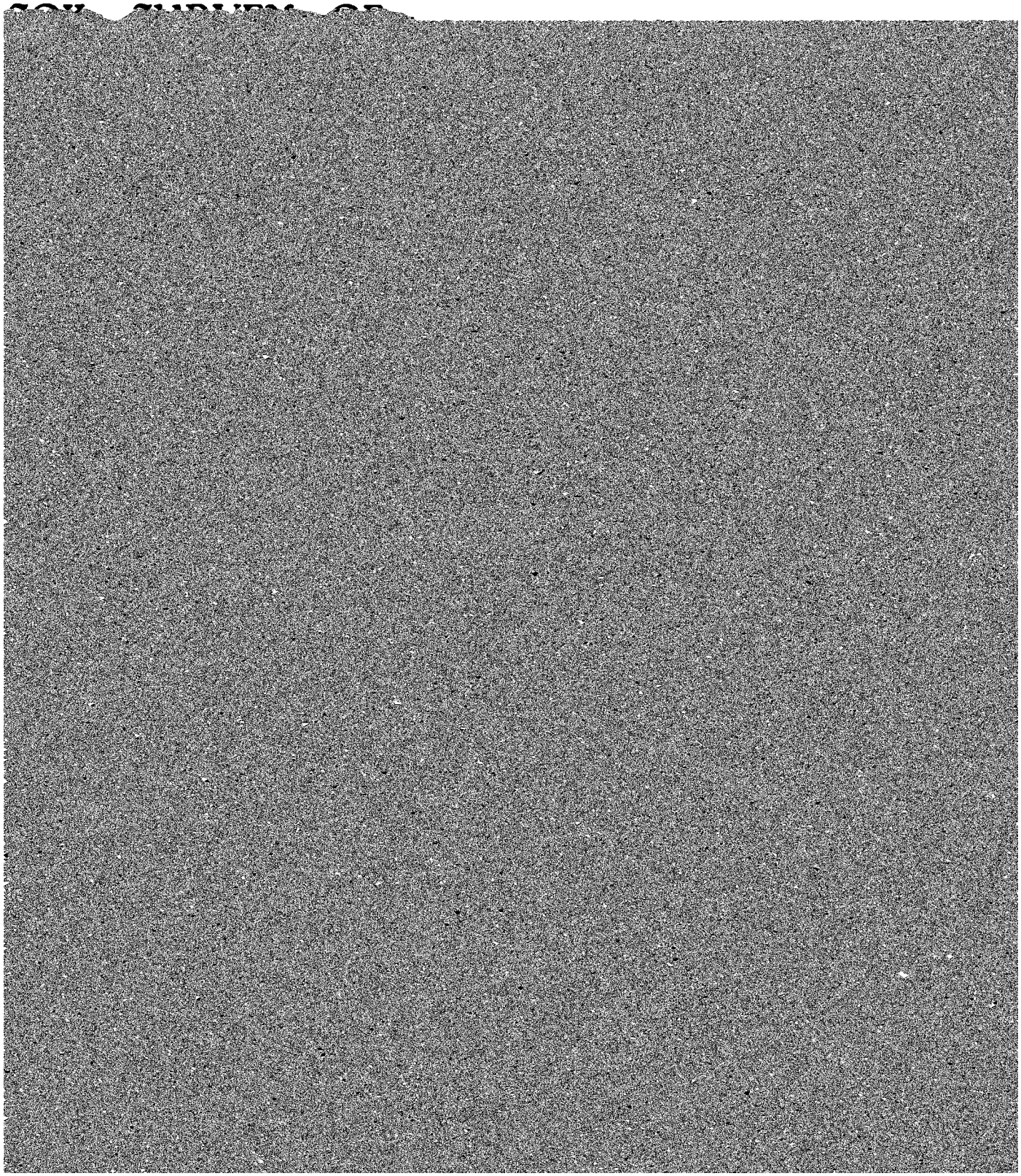
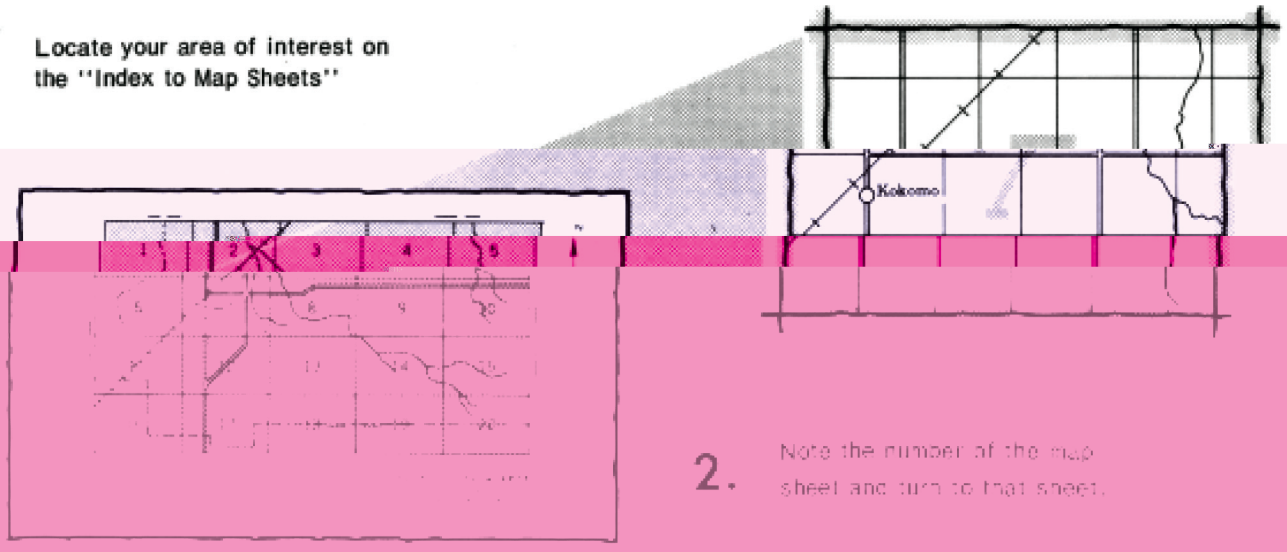


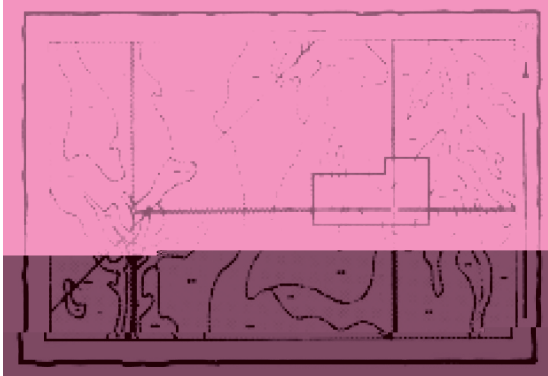
HOW TO USE

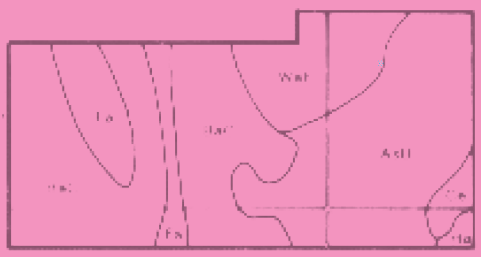
1. Locate your area of interest on the "Index to Map Sheets"



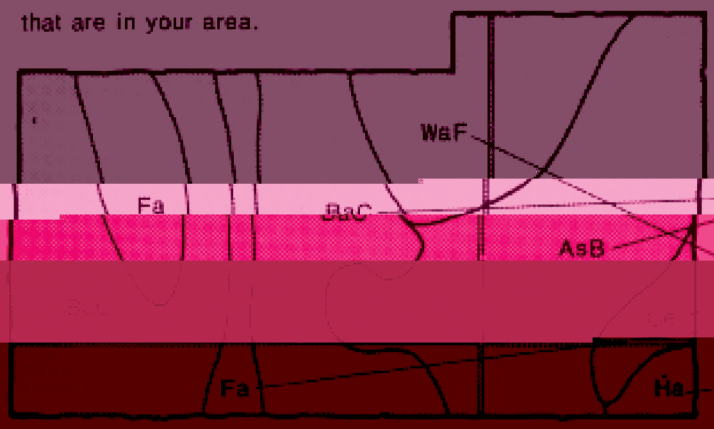
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

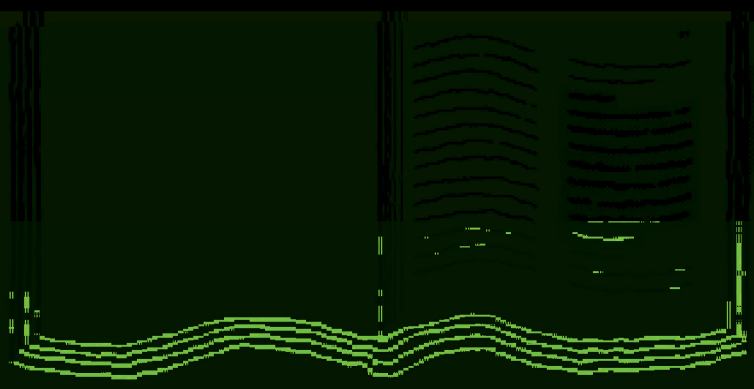


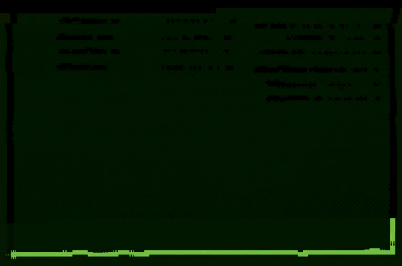
Symbols

- AsB
- BaC
- Ce
- Fa
- Ha
- WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.





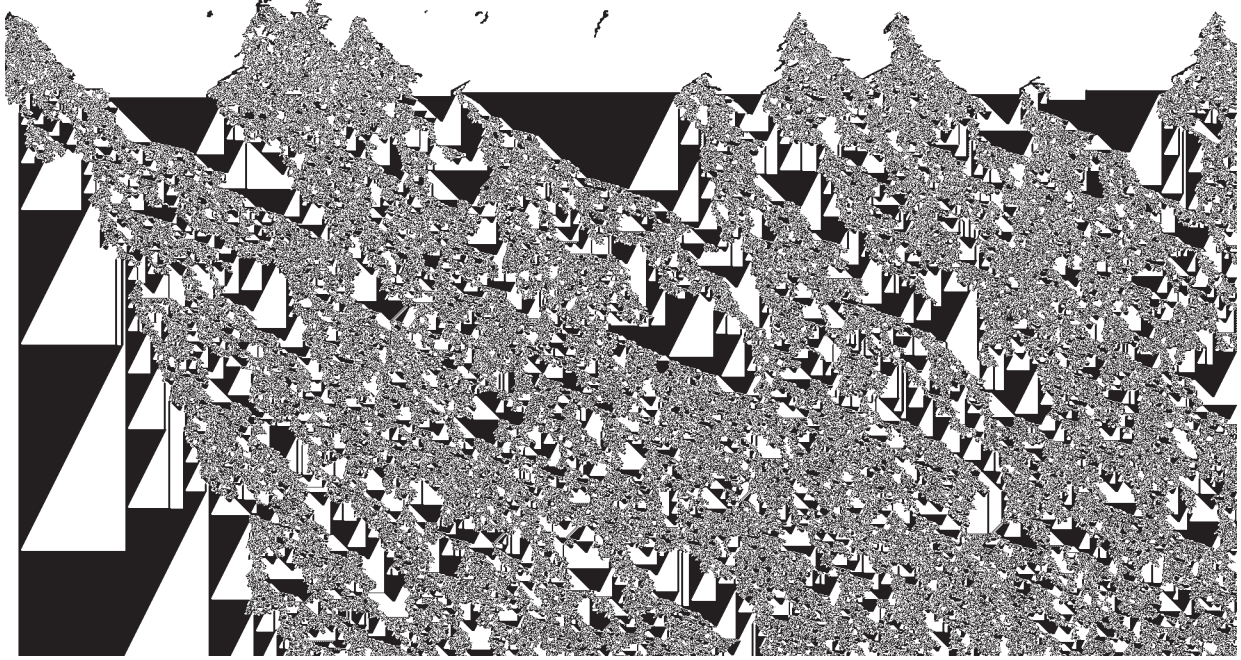
6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.

"Contents" for page of the publication that will meet your specific needs.

Consult

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1968-74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service; the Ohio Department of Natural Resources, Division of Lands and Soil; and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Mercer County Soil and Water Conservation District.



Contents

	Page
Index to map units	iv
Summary of tables	v
Foreword	vii
General nature of the county	1
Climate	1
Physiography, relief, and drainage	2
Geology	2
Farming	3
History	3
How this survey was made	3
General soil map for broad land-use planning	4
1. Blount-Pewamo	4
2. Blount-Glynwood	4
3. Montgomery-McGary	5
4. Defiance-Wabasha	5
5. [illegible]	5
Engineering test data	40
Soil series and morphology	40
Blount series	40
Carlisle series	40
Defiance series	41
Digby series	41
Edwards series	42
Eel series	42
Eldean series	43
Elliott series	43
Gallman series	44
Genesee series	44
Glynwood series	45
Haskins series	45
McGary series	46
Millgrove series	46

Index to map units

	Page
BoA—Blount silt loam, 0 to 2 percent slopes	7
McB—McGary silty clay loam, 2 to 6 percent slopes	17

Summary of Tables

Page

Acreage and proportionate extent of the soils (Table 4) 68

Summary of Tables—Continued

	Page
Temperature and precipitation data (Table 1)	66
Temperature. Precipitation.	
Water management (Table 11)	83
Pond reservoir areas. Embankments, dikes, and levees. Aquifer-fed excavated ponds. Drainage. Terraces and diversions. Grassed waterways.	
Wildlife habitat potentials (Table 13)	87
Potential for habitat elements—Grain and seed crops, Grasses and legumes, Wild herbaceous plants, Hardwood trees, Coniferous plants, Wetland plants, Shallow water areas. Potential as habitat for—Openland wildlife, Woodland wildlife, Wetland wildlife.	
Woodland management and productivity (Table 7)	72
Ordination symbol. Management concerns—Erosion hazard, Equipment limitation, Seedling mortality, Windthrow hazard. Potential productivity—Common trees, Site index. Trees to plant.	
Yields per acre of crops and pasture (Table 5)	69
Corn. Soybeans. Winter wheat. Oats. Grass-legume hay.	

Foreword

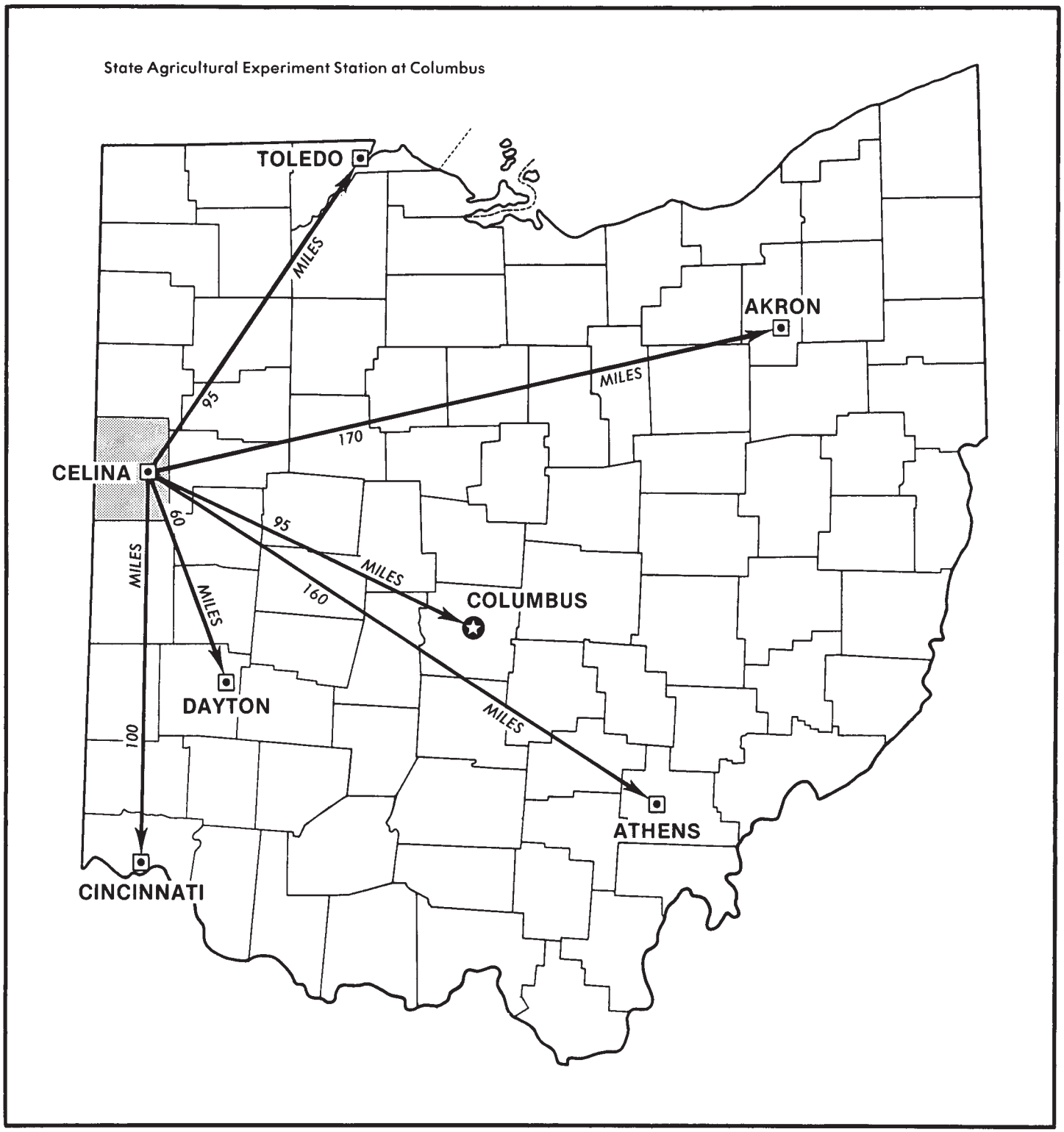
The Soil Survey of Mercer County, Ohio contains basic information useful for any land planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that a selected land use will have on the environment.

This soil survey has been prepared to meet the needs of different users. Farmers, ranchers, foresters, or agronomists can use it to determine the potential of the soil and the management required for food and fiber production. Planners, community officials, engineers, developers, builders, or homebuyers can use it to plan use of land, select sites for construction, develop soil resources, and identify special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in wildlife management, recreation, waste disposal, or pollution control can use the soil survey to help understand, protect, and enhance the environment.

Many people assume that soils are all somewhat alike. They are unaware that great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. This publication also shows, on the general soil map, the location of broad areas of soils and, on detailed soil maps, the location of each kind of soil. It provides descriptions of each kind of soil in the survey area and gives much information about each soil for specific uses. Additional information or assistance in using this publication is available in the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be helpful in the conservation, development, and



Location of Mercer County in Ohio.

SOIL SURVEY OF MERCER COUNTY, OHIO

By T. C. Priest, Ohio Department of Natural Resources, Division of Lands and Soil

Fieldwork by: T. C. Priest, A. R. Brock, F. L. Cunningham, and D. L. Brown, Ohio Department of Natural Resources, Division of Lands and Soil; and L. A. Tornes and V. L. Siegenthaler, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Ohio Department of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center

General nature of the county

MERCER COUNTY is in west-central Ohio, along the Indiana border (see facing page). It occupies about 444 square miles, or 284,160 acres. Celina, the county seat and the only city, is in the east-central part of the county. In 1970, the total population of the county was 35,265.

Mercer County is one of the more important agricultural counties in Ohio. Cash grain farming dominated by corn and soybeans is the major farm enterprise in the northern part of the county. Cash grain and livestock farming are dominant in the southern part. Tomatoes are an important specialty crop.

Poor natural drainage is the major soil limitation in the flatter areas. Erosion is the major hazard in sloping areas. If adequate artificial drainage is provided, erosion is controlled, and the soil is otherwise well managed, most of the soils are highly productive.

Although Mercer County is dominantly agricultural, nonfarm development, particularly residential development, is constantly taking place. This development is not on the scale that prevails in large metropolitan areas, but many of the same limitations and hazards are commonly encountered. These limitations and hazards are particularly evident near Grand Lake St. Marys.

Climate

Mercer County is cold in winter and warm in summer. Winter precipitation, frequently snow, results in a good accumulation of soil moisture by spring and minimizes drought during summer on most soils. Normal annual precipitation is adequate for all crops that are suited to the temperature and the length of the growing season.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Celina, Ohio for the period 1957 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 28 degrees F, and the average daily minimum temperature is 20 degrees. The lowest temperature on record, which occurred at Celina on January 16, 1972, is minus 19 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred on July 24, 1965, is 99 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 20 inches, or 55 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 17 inches. The heaviest 1-day rainfall during the period of record was 4.43 inches at Celina on September 17, 1969. Thunderstorms occur on about 41 days each year, and 20 of these days are in summer.

Average seasonal snowfall is 36 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 22 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 70 in summer and 40 in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 12 miles per hour, in March.

Tornadoes and severe thunderstorms occur occasionally. They are usually of local extent and of short duration, and the resulting damage varies from area to area.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

Physiography, relief, and drainage

Mercer County is a part of the Indiana and Ohio Till Plain section of the Central Lowland physiographic province. The highest elevation is about 1,070 feet above sea level, near the Mercer-Darke County line between Union City and Jenkins Roads in southwestern Gibson Township. The lowest elevation is 780 feet above sea level where the St. Marys River enters Van Wert County.

Much of the northern two thirds of the county has a

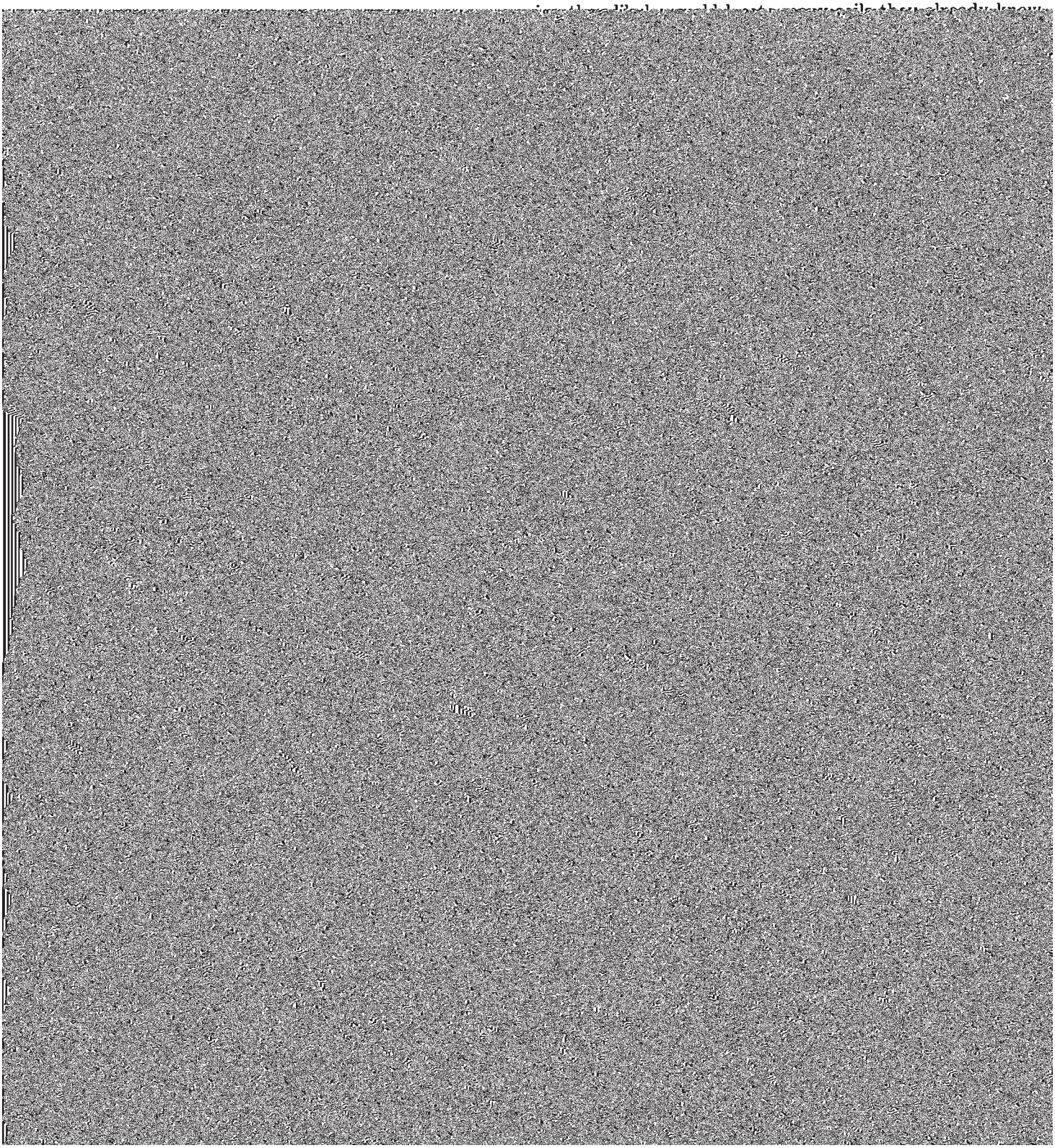
of the Teays River system. The approximate location of the Teays River shows that the river entered present day Mercer County from the east in the area of Grand Lake and coursed northwestward into Indiana in the latitude of Black Creek Township (*5*).

The Wisconsin age glacial drift includes till; outwash; loess, or silty wind-blown deposits; lacustrine material, or clayey and silty water-deposited material; and alluvium. The glacial drift covers limestone bedrock, mostly of the Niagara Formation of Silurian age. A small part of the

In the present stream valleys, a more recent deposition of soil material has taken place. This alluvium was eroded from soils on uplands and terraces and deposited on flood plains. Eel, Defiance, Genesee, Shoals, Sloan, and Wabasha soils formed in this alluvium.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area know-



General soil map for broad land-use planning

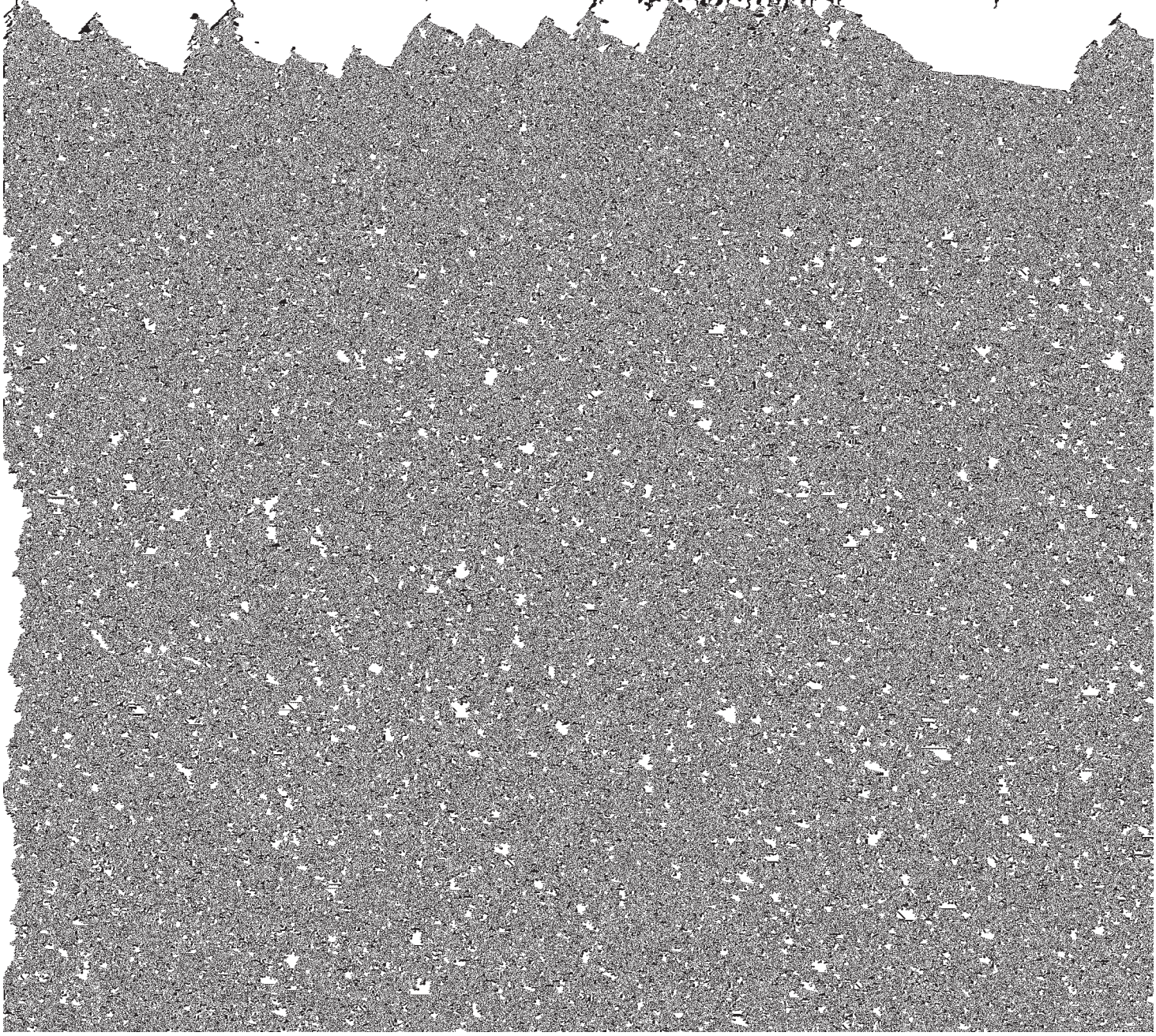
The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most

wheat, oats, hay, pasture grasses, and tomatoes are the principal crops. The soils have good potential for farming and woodland. The potential is poor for building site development and sanitary facilities and fair or poor for most recreation uses.

The seasonal high water table is the main limitation for most uses. Maintaining the tilth of both soils and controlling erosion on the gently sloping Blount soils are also major concerns for farming. The moderately slow or slow permeability severely limits these soils for such uses as septic tank effluent fields. Low strength limits building site development.

2. Blount-Glynwood



3. Montgomery-McGary

Level, nearly level, and gently sloping, very poorly drained and somewhat poorly drained soils formed in lake-deposited clay and silt

This map unit occurs as broad areas in old shallow glacial lakes on till plains. Most areas are flat, and slight rises are interspersed with drainageways.

This map unit makes up about 6 percent of the county. It is about 65 percent Montgomery soils, 21 percent McGary soils, and 14 percent soils of minor extent.

Montgomery soils are very poorly drained, level and nearly level, fine textured soils in depressional areas. Permeability is slow or very slow, and runoff is very slow. The seasonal high water table is near the surface. McGary soils are somewhat poorly drained, nearly level and gently sloping, moderately fine textured soils on rises. Permeability is slow or very slow, and runoff is slow and medium. The seasonal high water table is between depths of 12 and 36 inches.

Of minor extent in this map unit are Pewamo soils in depressions; Blount soils on slight rises and low knolls; and Edwards soils, which formed in an organic deposit over marl, in some of the deeper depressions. Also of minor extent are Olentangy soils southeast of the village of Cranberry and at the base of the Fort Wayne moraine.

The major soils are used mainly for cash grain farming. Corn and soybeans are the principal crops. Tomatoes are an important specialty crop on the Montgomery soils. Both major soils have good potential for farming, woodland, and habitat for wetland wildlife and poor potential for building site development and sanitary facilities. The potential for most recreation uses is poor or fair.

The main limitation for most uses is the very poor and somewhat poor natural drainage. The slow or very slow permeability and the high shrink-swell potential are limitations for building site development and sanitary facilities. McGary soils are better suited than Montgomery soils to most community development uses. Maintenance of tilth in the fine textured and moderately fine textured surface layer is a major concern for farming.

4. Defiance-Wabasha

Level and nearly level, somewhat poorly drained and very poorly drained soils formed mainly in fine textured and moderately fine textured recent alluvium

This map unit is on flats on flood plains and is frequently flooded. Areas are narrow along the smaller streams and wide along the larger ones.

This map unit makes up about 3 percent of the county. It is about 43 percent Defiance soils, 20 percent Wabasha soils, and 37 percent soils of minor extent.

Defiance soils are somewhat poorly drained, level and nearly level, fine textured soils that commonly are adjacent to the streams and occupy the entire flood plain along some small streams. They formed in fine textured and moderately fine textured recent alluvium. Permeability and runoff are slow or very slow. Wabasha soils are very poorly drained, level and nearly level, fine textured soils in low lying areas on flood plains. They formed in fine textured recent alluvium. Permeability is slow, and runoff is very slow. Some areas are ponded after the floodwater recedes. Both soils have a seasonal high water table near the surface.

Of minor extent in this map unit are Sloan, Shoals, and Eel soils in small areas that are intermingled with the major soils on the flood plains. Also of minor extent are Ockley and Haskins soils in narrow strips on stream terraces and Glynwood and Morley soils in narrow strips on valley walls.

The major soils are used mainly for cash grain farming. Some areas are used for pasture and woodland. The soils have good potential for farming and good or fair potential for woodland. The potential for building site development, sanitary facilities, and most recreation uses is poor.

The main limitations for most uses are the somewhat poor and very poor natural drainage and the flood hazard. The slow or very slow permeability and the high shrink-swell potential are additional limitations for building site development and sanitary facilities. Maintenance of tilth in the fine textured surface layer is a major concern for farming. Winter crops and early spring crops, such as wheat, oats, and specialty crops, are generally not grown because of the flood hazard. Surface drains greatly improve drainage.

5. Shoals-Genesee

Level and nearly level, somewhat poorly drained and well drained soils formed in medium textured and moderately coarse textured recent alluvium

This map unit is on flats on flood plains and is commonly flooded. Most areas are long and narrow.

This map unit makes up about 2 percent of the county. It is about 33 percent Shoals soils, 25 percent Genesee soils, and 42 percent soils of minor extent.

Shoals soils are somewhat poorly drained, level and nearly level, medium textured soils in low lying areas near slope breaks to the uplands. They formed in medium textured recent alluvium. The seasonal high water table is between depths of 12 and 36 inches. Permeability is moderate, and runoff is very slow. Genesee soils are well drained, level and nearly level, medium textured soils that are in the highest positions on the flood plains, commonly adjacent to the stream. They formed in medium textured and moderately coarse textured recent alluvium. Permeability is moderate, and runoff is slow.

Of minor extent in this map unit are Sloan and Wabasha soils in the lowest positions on the flood plains and Eel soils in an intermediate position between Genesee and Shoals soils. Also of minor extent are Blount, Glynwood, and Morley soils in narrow strips on valley walls and uplands.

The major soils are used mainly for annual field crops and specialty crops that are planted after the period of most spring flooding. Such crops as winter wheat may be severely damaged by floodwater in winter and early in spring. Some areas are used for pasture. The soils have good potential for farming and woodland. They have poor potential for building site development, sanitary facilities, and many recreation uses.

Diking to control flooding is difficult. Artificial drainage is needed in Shoals soils for more timely tillage and improved crop production. Adequate outlets are difficult to establish in many areas because of the flat topography and the water level in the streams. The flood hazard on both soils and the somewhat poor natural drainage of the Shoals soils are serious limitations for building site development, sanitary facilities, and many recreation uses.

6. Sloan

Level and nearly level, very poorly drained soils formed in moderately coarse textured to moderately fine textured recent alluvium

This map unit is in low lying flat areas on flood plains and is frequently flooded. Most areas are long and narrow.

This map unit makes up about 1 percent of the county. It is about 74 percent Sloan soils and 26 percent soils of minor extent.

Sloan soils are very poorly drained, level and nearly level, moderately fine textured soils that are in depressed areas near slope breaks to the uplands along the larger streams. They occupy the entire flood plain along small streams. They formed in moderately coarse textured to moderately fine textured recent alluvium. The seasonal high water table is near the surface. Permeability is moderate or moderately slow. Runoff is very slow, and some areas are ponded.

Of minor extent in this map unit are Shoals soils in low lying areas near slope breaks to the uplands and Eel soils adjacent to the streams.

The major soils are used for row crops, pasture, and woodland. They are not well suited to small grain because of the very poor natural drainage and the flooding. Areas that are difficult to drain are commonly used for pasture and woodland. The soils have good potential for farming and woodland. The potential for building site development, sanitary facilities, and recreation uses is poor.

Flooding and seasonal wetness limit these soils for [illegible] In many places outlets for subsurface drains

This map unit occurs as broad to narrow areas on stream terraces. Most areas are flat, and slight undulations are interspersed with drainageways.

This map unit makes up about 1 percent of the county. It is about 45 percent Millgrove soils, 20 percent Digby soils, 15 percent Gallman soils, and 20 percent soils of minor extent.

Millgrove soils are very poorly drained, level and nearly level, moderately fine textured soils in low lying positions. The seasonal high water table is at the surface. Permeability is moderate, and runoff is very slow. Digby soils are somewhat poorly drained, nearly level and gently sloping, medium textured soils on slightly elevated flats, on short slope breaks, and near the base of the flanks of stream terraces. The seasonal high water table is near the surface. Permeability is moderate in the subsoil and rapid in the substratum. Runoff is slow or medium. Gallman soils are well drained and moderately well drained, gently sloping, medium textured and moderately coarse textured soils on low knolls and slope breaks. Permeability is moderately rapid, and runoff is slow or medium.

Of minor extent in this map unit are Haskins, Glynwood, Morley, Blount, and Rawson soils on slope breaks to the uplands and Defiance, Wabasha, Genesee, Eel, Shoals, and Sloan soils in narrow strips on flood plains. Also of minor extent are Ockley soils on flats and slight rises.

The major soils are used mainly for farming and specialty crops, for which they have good potential. They also have good potential for woodland. Millgrove and Digby soils have poor potential for building site development and recreation uses, but Gallman soils have good potential for those uses.

The seasonal wetness of the Millgrove and Digby soils is the main limitation. This limitation can be overcome for such uses as farming by surface and subsurface drains. These soils dry earlier in spring if artificially drained. The effluent from sanitary facilities on these soils can pollute underground water supplies.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for

the management concerns and practices needed are discussed.

Union Township, it is loam that is less susceptible to crusting.

south face of moraines are oblong or long and narrow.

Seasonal wetness, low strength, and slow or moderately

Df—Defiance silty clay. This deep, level and nearly level, somewhat poorly drained soil is on flood plains and is subject to frequent flooding. It commonly is adjacent to the streams and occupies the entire flood plain along some small streams. Slope ranges from 0 to 2 percent. Most areas are long and narrow and range from 2 to several hundred acres in size.

Typically, the surface layer is dark gray, firm silty clay loam about 10 inches thick. The subsurface layer is about [illegible] inches thick and is grayish brown, mottled, firm clay loam. The sub-

slightly elevated flats on stream terraces. Most areas are long and narrow, oval, or irregularly shaped and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 8 inches thick. The subsoil is about 36 inches thick. The upper part is grayish brown, mottled, friable and firm loam and clay loam; the next part is dark yellowish brown, mottled, firm clay loam; and the lower

seepage can result in pollution of the underground water supplies. Drainage ditches and subsurface drains lower the seasonal high water table. Landscaping building sites keeps surface water away from the foundations. Local roads can be improved by artificial drainage and a suitable base material. Capability subclass IIw; woodland suitability subclass 2o.

DmB—Digby loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on short slope breaks and near the base of the flanks of stream terraces. A few areas are on till plains. Most areas are long and narrow, oval, or irregularly shaped and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 8 inches thick. The subsoil is about 34 inches thick. The upper part is grayish brown, mottled, friable and firm loam and clay loam; the next part is dark yellowish brown, mottled, firm clay loam; and the lower part is grayish brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is dark grayish brown and gray, mottled, loose gravelly sand and gravelly sandy loam. Depth to the substratum is 48 to 80 inches in some areas. In these areas, available water capacity is higher and the soil is not so droughty.

Included with this soil in mapping are small areas of Gallman soils on the upper part of slopes and on low knolls and some areas where the surface layer is sandy loam, soil blowing is a greater hazard, and cultivation is easier. Also included, on the periphery of some mapped areas, are narrow strips of Haskins soils that have moderately fine textured or fine textured glacial till or lacustrine material in the lower part.

The seasonal high water table is near the surface in winter and in spring and other extended wet periods. Permeability is moderate in the subsoil and rapid in the substratum. The rooting depth is influenced by the water

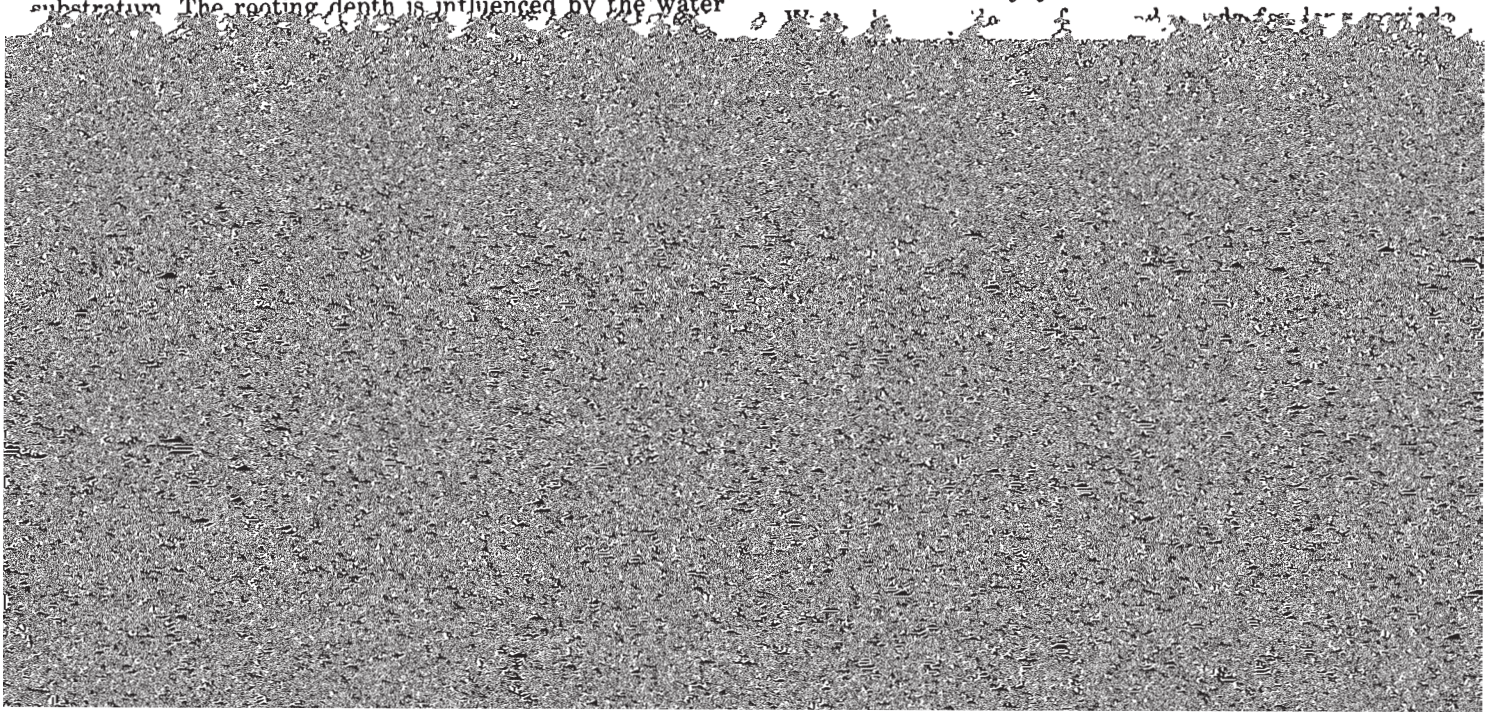
This soil is well suited to trees and other vegetation grown as habitat for wildlife. Species that can tolerate some wetness should be selected for new plantings. Plant competition can be reduced by spraying, mowing, and disking.

Seasonal wetness and seepage severely limit this soil as a site for buildings, sanitary facilities, and recreation uses. The seepage can result in pollution of the underground water supplies. Drainage ditches and subsurface drains lower the seasonal high water table. Landscaping on building sites keeps surface water away from the foundations. Local roads can be improved by artificial drainage and a suitable base material. Capability subclass IIe; woodland suitability subclass 2o.

Ed—Edwards muck. This deep, level and nearly level, very poorly drained, organic soil is in depressions. It is subject to frequent flooding. Slopes range from 0 to 2 percent. Most areas are 2 to 37 acres in size and are oblong or irregularly shaped.

Typically, the surface layer is black, very friable muck about 10 inches thick. The subsurface layer, to a depth of about 28 inches, is black, very friable muck. The substratum to a depth of about 60 inches is light gray, friable marl. It is mottled in the upper part. In some areas the muck is 12 to 16 inches deep over the marl, and in others a thin layer of mineral material is between the muck and the marl.

Included with this soil in mapping are small areas of Carlisle and Olentangy soils and narrow strips, on the periphery of some mapped areas, of Pewamo and Montgomery soils. The included Pewamo and Montgomery soils are more difficult to till. Also included are a few areas where sedimentary peat is at a depth of 24 to 36 inches and areas where the surface layer is mucky silt loam and the substratum is clayey.



trolled drainage in areas where the water level can be raised or lowered reduces the shrinkage. When dry, this soil is subject to soil blowing. The risk of soil blowing can be reduced by irrigation, windbreaks, and cover crops.

This soil is not well suited to woodland unless it is drained. Undrained areas support water-tolerant trees and some cattails, reeds, or sedges. The wetness seriously limits the use of logging equipment. Logging can generally be done during extended dry periods.

Building site development, sanitary facilities, and recreation uses are seriously limited by flooding, wetness, low strength, and seepage. Undrained areas provide good habitat for ducks, muskrat, and other wetland wildlife. Capability subclass IVw; woodland suitability subclass 4w.

Ee—Eel silt loam. This deep, level and nearly level, moderately well drained soil is on flood plains. It occupies the entire flood plain along small streams in some areas. Along the larger streams, it is commonly near the slope breaks to the uplands. It is commonly flooded for brief periods in fall, winter, and spring. Slopes range from 0 to 2 percent. Areas are broad, oblong, or irregularly shaped. They range from about 8 to 30 acres in size.

Typically, the surface layer is dark grayish brown, very friable silt loam about 8 inches thick. The subsoil, to a depth of about 42 inches, is dark brown, friable and very friable silt loam. The substratum to a depth of about 68 inches is dark gray, friable sandy loam.

Included with this soil in mapping are narrow strips of Genesee soils adjacent to the streams and small areas of Shoals soils in depressions. Also included are areas where the substratum has slowly permeable silty clay or silty clay loam layers.

The seasonal high water table is at a depth of 36 to 72 inches in winter and spring. Permeability is moderate. The root zone is deep and has a high available water capacity. The surface layer crusts after heavy rains, and the crusting reduces the infiltration rate. Runoff is slow. The shrink-swell potential is low. Reaction ranges from slightly acid to mildly alkaline in the surface layer and from slightly acid to moderately alkaline in the subsoil. Organic-matter content is moderate.

This soil is mainly used for cash grain farming. Some areas on narrow flood plains are permanent pasture. The soil has good potential for farming and woodland and poor potential for building site development and sanitary facilities.

Flooding is the major hazard if this soil is farmed. The soil is suited to the commonly grown annual field crops and specialty crops. Such crops as winter wheat can be severely damaged by floodwater in winter and early in spring. The soil is suited to grasses and legumes for pasture. Cover crops and crop residue maintain organic-matter content, reduce crusting, and protect the surface in areas that are subject to scouring during floods. Randomly spaced subsurface or surface drains are needed in some areas of the included wetter soils, especially if specialty crops are grown.

This soil is well suited to trees and other vegetation grown as habitat for wildlife. Spraying, mowing, and disking reduce plant competition.

The flood hazard and the seasonal high water table seriously limit this soil as a site for most buildings and sanitary facilities. The soil has good potential for such recreation areas as picnic areas and hiking trails. Diking to control flooding is generally difficult. The soil is a good source of topsoil. Capability subclass IIw; woodland suitability subclass 1o.

ElB—Eldean loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on short slope breaks on stream terraces and in outwash areas on end moraines. Most areas are long and narrow or oblong and range from 2 to 17 acres in size.

Typically, the surface layer is brown, friable loam about 9 inches thick. The subsoil is about 28 inches thick. The upper part is dark brown, firm clay; the next part is brown, firm gravelly clay; the lower part is brown, friable and very friable gravelly clay loam and gravelly loam. The substratum to a depth of about 70 inches is grayish brown and yellowish brown, loose fine gravelly loamy sand, loamy fine sand, and gravelly loamy sand.

Included with this soil in mapping are small areas of Ockley soils on the lower part of slopes and some small areas where the surface layer is gravelly loam. Also included are areas where slopes are of 0 to 2 percent and strips of eroded soils on the upper part of slopes.

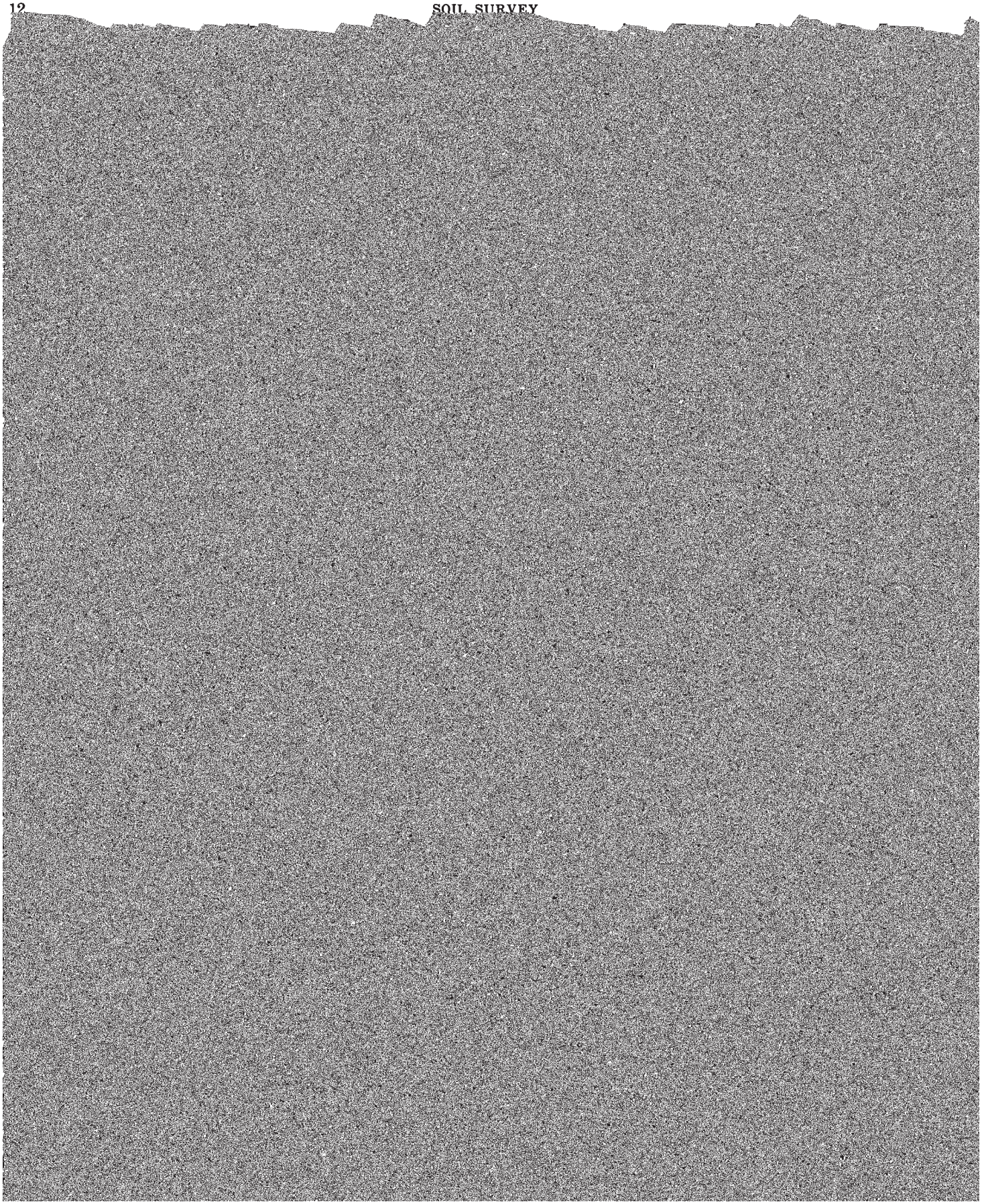
Permeability is moderate in the subsoil and rapid or very rapid in the substratum. The root zone is mainly moderately deep and has a moderate available water capacity. Runoff is medium. The shrink-swell potential is moderate or low in the subsoil and low in the substratum. Reaction is medium acid to neutral in the surface layer, medium acid to mildly alkaline in the upper part of the subsoil, and neutral to moderately alkaline in the lower part. Organic-matter content is moderate.

This soil is used mainly for cash grain farming. It has good potential for farming, woodland, building site development, and most recreation uses.

This soil is well suited to corn, soybeans, wheat, oats, hay, pasture, and specialty crops. Because of the limited available water capacity, it is better suited to early maturing crops than to crops that mature late in summer. It is well suited to irrigation. The principal management concern is control of erosion. Minimizing tillage, returning crop residue to the soil, and including sod crops in the cropping sequence reduce the risk of erosion, improve tilth, and increase water intake.

This soil is well suited to trees and habitat for wildlife. Machine planting of tree seedlings is practical on this soil. Plant competition can be reduced by spraying, mowing, and disking.

Although low strength is a moderate limitation, this soil is suited to building site development. The low strength can be overcome by extending building foundations to the underlying sand. Local roads can be improved by replacing the subsoil with suitable base material. Sanitary facili-



GaB—Gallman sandy loam, 2 to 6 percent slopes. This deep, gently sloping, well drained or moderately well drained soil is on low knolls and short slope breaks on stream terraces. Most areas are long and narrow and range from 4 to 30 acres in size.

Typically, the surface layer is dark brown, friable sandy loam about 8 inches thick. The subsoil is about 67 inches thick. It is mostly brown and dark brown, firm gravelly

stream terraces. Most areas are long and narrow or oval and range from 2 to 35 acres in size.

Typically, the surface layer is dark brown, friable loam about 8 inches thick. The subsoil is about 67 inches thick. It is yellowish brown and brown, friable and firm loam, sandy clay loam, and gravelly clay loam in the upper part and dark brown, friable and firm sandy loam and gravelly sandy clay loam in the lower part. It is mottled below a

Typically, the surface layer is dark brown, friable silt loam about 10 inches thick. The subsoil, to a depth of about 48 inches, is dark brown and dark yellowish brown, friable silt loam. The substratum to a depth of about 60 inches is yellowish brown, stratified silt loam and loam. In some areas the surface layer is loam.

Included with this soil in mapping are narrow strips of Eel soils at a slightly lower elevation on the flood plains. Also included are small areas of Shoals soils in slight depressions near slope breaks to the uplands.

Permeability is moderate. The root zone is deep and has a high available water capacity. Crusting of the surface layer after heavy rains reduces the infiltration rate. Runoff is slow. The shrink swell potential is low. Reaction is slightly acid or neutral in the surface layer and slightly [illegible] Organic matter [illegible]

The seasonal high water table is perched between depths of 24 and 36 inches in winter and in spring and other extended wet periods. Permeability is slow. The root zone is mainly moderately deep to compact glacial till. Available water capacity is moderate. Tilth is fair. Runoff is medium. The shrink-swell potential is moderate. Reaction is medium acid to neutral in the surface layer and ranges from very strongly acid to neutral in the upper part of the subsoil and from slightly acid to moderately alkaline in the lower part. Organic-matter content is moderate.

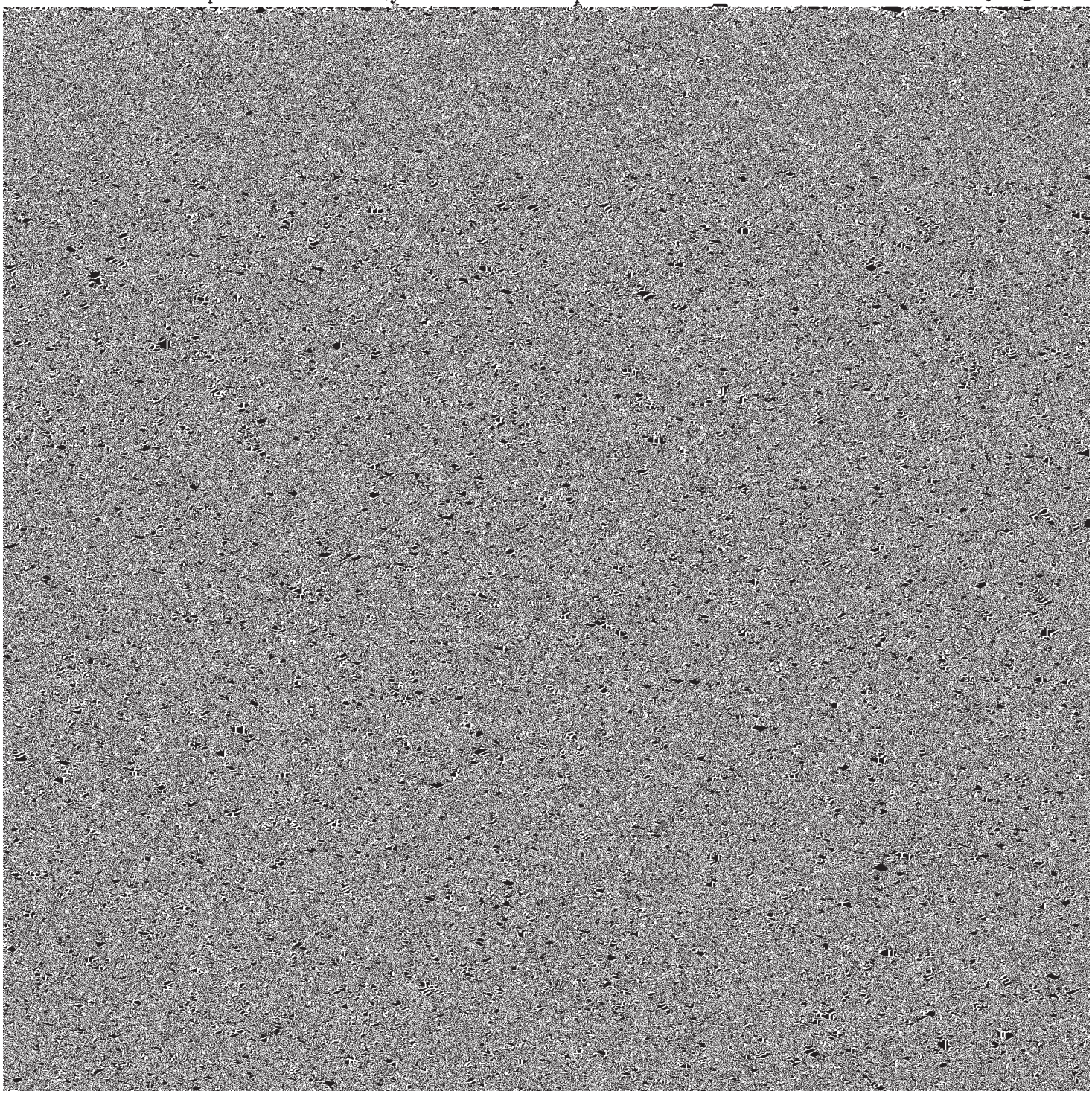
This soil is used principally for cash grain farming in the northern part of the county and for cash grain and livestock farming in the southern part. It has good potential for farming and woodland. The potential for building site development and sanitary facilities is fair or poor.

Included with this soil in mapping are small areas of the somewhat poorly drained Blount soils along drainageways and in nearly level areas and some areas of Morley soils on the crest of knolls. Also included are narrow strips where slopes are 6 to 9 percent and small areas of severely eroded soils that are in poor tilth.

The seasonal high water table is perched between depths of 24 and 36 inches in winter and in spring and other extended wet periods. Permeability is slow. The thick. The upper part is yellowish brown, firm silty clay loam; the next part is dark yellowish brown, mottled, very firm clay; the lower part is yellowish brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is yellowish brown, firm clay loam.

Included with this soil in mapping are small areas of the well drained Morley soils on the upper part of slopes.

The seasonal high water table is perched between depths of 24 and 36 inches in winter and in spring and



grayish brown, mottled, friable loam; the middle part is brown and dark grayish brown, mottled, firm sandy clay loam; the lower part is grayish brown, mottled, firm clay loam. The substratum to a depth of about 60 inches is dark grayish brown, mottled, firm clay loam.

Included with this soil in mapping are small areas of Blount soils formed in glacial till on till plains and Digby

HnB—Haskins loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on low knolls on stream terraces and end moraines. Most areas are long and narrow or oval and are 3 to 12 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 8 inches thick. The subsoil is about 26 inches thick. The upper part is light brownish gray and

The seasonal wetness and the slow or very slow permeability severely limit the use of this soil for building site development and sanitary facilities. Drainage ditches and subsurface drains lower the perched water table. Local roads can be improved by artificial drainage and suitable base material, which overcome the risk of damage caused by frost action and low strength. Capability subclass IIe; woodland suitability subclass 2o.

McA—McGary silty clay loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on very slight rises in old shallow glacial lakes on till plains. Most areas are oval, long and narrow, or irregularly shaped and range from 2 to 35 acres in size. A few broad, irregularly shaped areas are as large as 125 acres.

Typically, the surface layer is dark grayish brown, friable silty clay loam about 9 inches thick. The subsoil is mottled, firm silty clay about 32 inches thick. The upper part is brown, dark grayish brown, and grayish brown; the lower part is gray. The substratum to a depth of about 65 inches is gray and dark yellowish brown, firm and very firm silty clay. It is mottled in the upper part.

Included with this soil in mapping are narrow strips of Montgomery soils in depressions. These soils and some of the other included soils are subject to ponding. Areas along Bear Creek and Vandenbush Ditch in Granville Township are subject to flooding. In many included areas the surface layer is silt loam, tilth is better, and the soil crusts easily after heavy rains. Also included are some narrow areas where slopes are 2 to 6 percent and small areas of Blount soils that formed in glacial till.

The seasonal high water table is between depths of 1 foot and 3 feet in winter and in spring and other extended wet periods. Permeability is slow or very slow. The rooting depth is influenced by the water table. The root zone is deep and has a moderate available water capacity. Tilth is fair. Runoff is slow. The shrink-swell potential is high. Reaction is medium acid to neutral in the surface layer and the upper part of the subsoil and

This soil is well suited to trees. Species selected for planting should be tolerant of some wetness. Logging can be done during the drier part of the year. Plant competition can be reduced by spraying, mowing, and disking.

The seasonal wetness, the high shrink-swell potential, and the slow or very slow permeability severely limit this soil as a site for buildings and sanitary facilities. Landscaping on building sites is needed to keep surface water away from the foundations. Local roads can be improved by artificial drainage and suitable base material. Capability subclass IIIw; woodland suitability subclass 3w.

McB—McGary silty clay loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on rises in old shallow glacial lakes on till plains. Most areas are oval, long and narrow, or irregularly shaped and range from 2 to 30 acres in size.

Typically, the surface layer is brown, friable silty clay loam about 9 inches thick. The subsoil is mottled, firm silty clay about 32 inches thick. The upper part is brown, dark grayish brown, and grayish brown; the lower part is gray. The substratum to a depth of about 65 inches is gray and dark yellowish brown, firm and very firm silty clay. It is mottled in the upper part.

Included with this soil in mapping are small areas of Blount soils formed in glacial till on low knolls, narrow strips of Montgomery soils in depressions, and some areas along Bear Creek and Vandenbush Ditch that are subject to flooding. In many included areas the surface layer is silt loam, tilth is better, and the soil crusts easily after heavy rains. Also included are narrow strips of eroded, better drained, sloping soils along the Wabash River in Granville Township.

The seasonal high water table is between depths of 1 foot and 3 feet in winter and in spring and other extended wet periods. Permeability is slow or very slow. The rooting depth is influenced by the water table. The root zone is deep and has a moderate available water capacity. Tilth is fair. Runoff is medium. The shrink-swell potential is high. Reaction is medium acid to neutral in

This soil is well suited to trees and other vegetation grown as wildlife habitat. Species selected for planting should be tolerant of some wetness. Logging can be done during the drier part of the year. Plant competition can be reduced by spraying, mowing, and disking.

The seasonal wetness, the high shrink-swell potential, and the slow or very slow permeability severely limit this soil as a site for buildings and sanitary facilities. Landscaping on building sites is needed to keep surface water away from the foundations. Local roads can be improved by artificial drainage and suitable base material. Capability subclass IIIe; woodland suitability subclass 3w.

Mg—Millgrove silty clay loam. This deep, level and nearly level, very poorly drained soil is in low lying positions on stream terraces. It occurs as broad, irregularly shaped areas that are several hundred acres in size and as small, irregularly shaped or long and narrow areas that are 2 to 40 acres in size. Slopes range from 0 to 2 percent.

tivated year after year if good tilth is maintained. Managing crop residue and planting cover crops improve tilth, help to control erosion, and increase the rate of water infiltration. Controlled grazing helps to prevent compaction.

This soil is suited to woodland. Species that can tolerate wetness should be selected for new plantings. Logging should be done during the drier part of the year. Spraying, disking, or mowing helps to reduce plant competition. Undrained areas are well suited as habitat for wetland wildlife.

The prolonged wetness and seepage severely limit this soil as a site for buildings, sanitary facilities, and recreation uses. As a result of the seepage from sanitary facilities, underground water supplies can be polluted. Suitable base material is commonly needed for roads. Also, artificial drainage is needed. Capability subclass IIw; woodland suitability subclass 2w.

Mh—Millsdale silty clay loam. This moderately deep,

residue and planting cover crops improve tilth and help to control erosion. Hay and pasture plants that can tolerate some wetness are best suited. Controlled grazing helps to prevent compaction.

This soil is suited to trees and other vegetation grown as wildlife habitat. Species that can tolerate wetness should be selected for new plantings. Logging can be done during the drier part of the year. Spraying, disking, or mowing reduces plant competition.

The prolonged wetness, the moderate depth to bedrock, the high shrink-swell potential, and the low strength severely limit this soil as a site for buildings, sanitary facilities, and recreation uses. Local roads can be improved by artificial drainage and suitable base material. This soil is a good source of limestone. Capability subclass IIIw; woodland suitability subclass 2w.

Mn—Montgomery silty clay. This deep, level and nearly level, very poorly drained soil is in depressional areas in old shallow glacial lakes on till plains. Some areas are along drainageways that have a low gradient. Most areas are large, broad, and irregularly shaped. Areas that are only 3 to 20 acres are oval, long and narrow, or irregularly shaped.

Typically, the surface layer is very dark gray, friable silty clay about 11 inches thick. The subsoil is about 37 inches thick. The upper part is dark gray, mottled, firm silty clay; the lower part is gray, mottled, firm silty clay and silty clay loam. The substratum to a depth of about 66 inches is gray, mottled, firm silty clay loam. In many large areas the surface layer is silty clay loam.

Included with this soil in mapping are small areas, in the lowest positions in depressions, of Edwards soils and other soils that have marl at a depth of 8 to 35 inches. These areas and other included areas along drainageways are subject to ponding and flooding. Also included are Pewamo soils on the edges of some mapped areas, small areas of McGary and Blount soils on slight rises, some areas where the surface layer is mucky silty clay, and other areas where 8 to 15 inches of local alluvial sediments overlies the surface layer.

The seasonal high water table is near the surface in winter and in spring and other extended wet periods. [illegible] and oats are poor in some years in areas where good drainage is not provided. Surface drains commonly remove excess surface water. Subsurface drains remove free water from the subsoil. Grade-changing structures in areas where the water from surface drains enters the deeper outlet ditches help to control erosion. This soil can be tilled only within a narrow range of moisture content if good tilth is to be maintained. It is cloddy if tilled when it is soft and sticky as a result of wetness. If pastures are grazed and trampled when too wet, the soil becomes compacted and hard. Managing crop residue and planting cover crops improve tilth and increase the rate of water infiltration.

This soil is suited to trees and other vegetation grown as habitat for wildlife. Species that can tolerate wetness should be selected for planting. Logging can be done during the drier part of the year. Plant competition can be reduced by spraying, mowing, and disking.

Building site development, sanitary facilities, and recreation uses are severely limited by the wetness, the slow or very slow permeability, the high shrink-swell potential, and the clayey surface layer. Local roads can be improved by artificial drainage and suitable base material. Undrained areas are well suited as habitat for wetland wildlife. Capability subclass IIIw; woodland suitability subclass 2w.

MrD2—Morley silt loam, 12 to 18 percent slopes, moderately eroded. This deep, moderately steep, well drained soil is on short slopes on the sides of valleys and hills on the dissected parts of ground moraines and end moraines. About half of the original surface layer has been lost through erosion. Areas are mostly long and narrow. They are mostly 2 to 10 acres but range from 2 to 50 acres.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 21 inches thick. The upper part is brown, mottled, firm silty clay loam; the lower part is dark yellowish brown and brown, mottled, very firm silty clay. The substratum to a depth of about 60 inches is dark yellowish brown and yellowish brown, mottled, very firm silty clay loam and clay loam.

Included with this soil in mapping are small areas of a [illegible]

potential for farming, building site development, sanitary facilities, and most recreation uses.

This soil is better suited to hay and pasture than to row crops, but row crops can be grown occasionally if erosion is controlled and good management is applied. The soil is poorly suited to specialty crops. The main concerns of management are the very severe erosion hazard and maintenance of tilth. The short slopes cause some problems in the operation of machinery and in the installation of erosion-control measures. If plowed when sticky and wet, the soil is cloddy. It puddles and crusts easily. Minimizing tillage, managing crop residue, planting cover crops, and tilling and harvesting at proper moisture levels help to control erosion and improve tilth. To control erosion in pastures, reseeding can be done with cover crops or companion crops or by trash mulch or no-till seeding methods. A thick plant cover helps to control erosion. Controlled grazing reduces soil compaction and increases plant growth.

This soil is suited to woodland. The slope moderately limits the use of equipment. Logging roads and skid trails should be protected against erosion and established across the slope wherever possible. This soil has good potential as habitat for woodland wildlife.

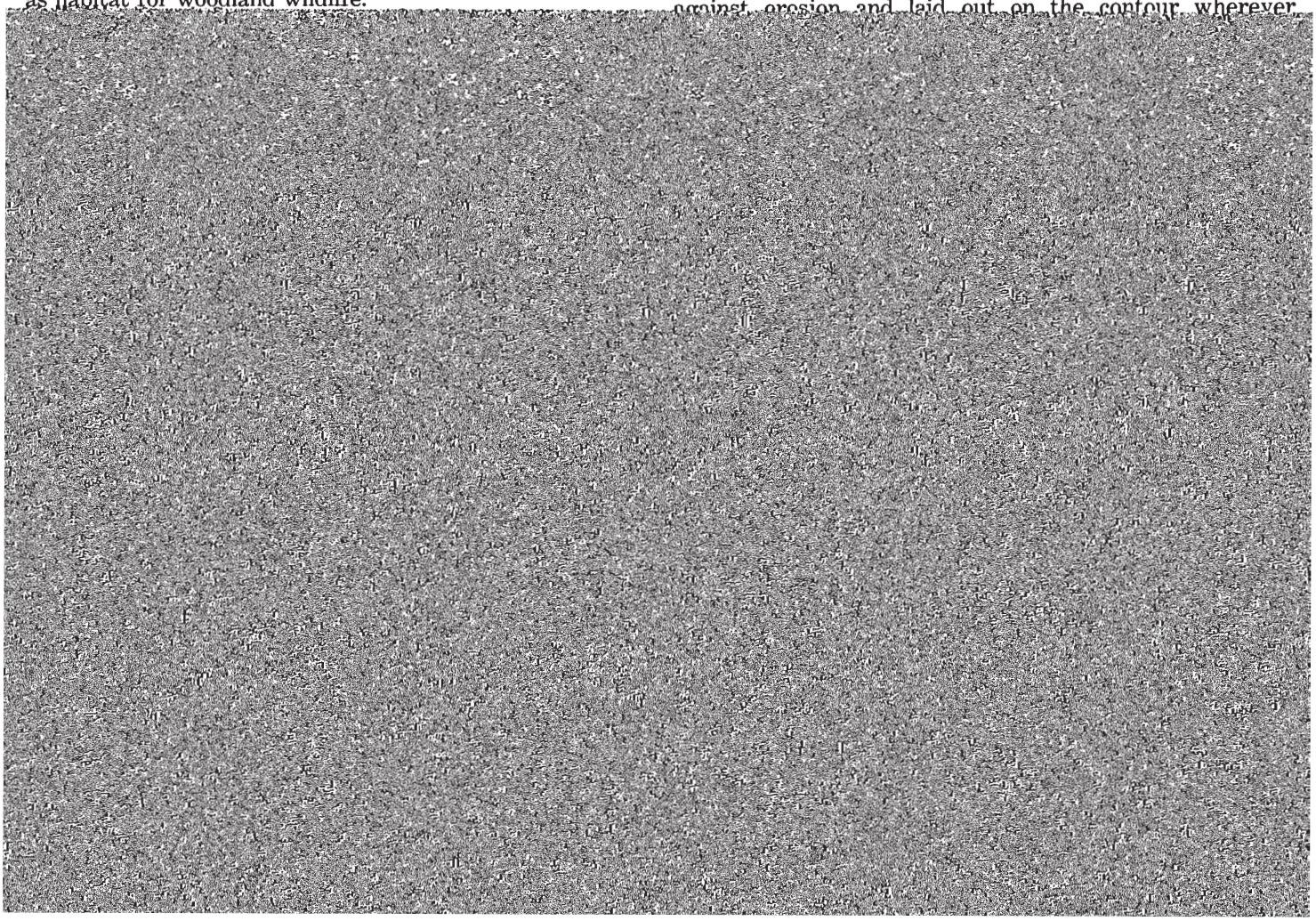
alkaline in the lower part. Reaction varies widely in the surface layer, depending on past liming practices. Organic-matter content is low.

Most of the acreage is woodland. Some areas are farmed. This soil has poor potential for most uses but has better potential for woodland and habitat for wildlife.

The steep slope and the erosion hazard severely limit the use of this soil for farming. The soil is too steep for cultivated crops but can be used for permanent pasture of grasses and legumes. Erosion is a serious hazard when the pasture is reseeded or unless an adequate plant cover is maintained. Grazing should be regulated to maintain enough vegetation to control erosion. The growth of pasture plants is limited during dry periods in summer.

This soil is well suited to woodland and to habitat for woodland wildlife. The steep slope moderately limits logging equipment. Logging roads should be protected against erosion and established across the slope wherever possible.

The steep slope severely limits this soil as a site for buildings and sanitary facilities. Cover should be maintained on the site as much as possible to reduce the erosion hazard. Trails in recreation areas should be protected against erosion and laid out on the contour wherever



This soil is used for farming and woodland. It has poor potential for farming and good potential for woodland. It has fair or poor potential for building site development, sanitary facilities, and most recreation uses.

Because of slope, past erosion, and a continuing hazard of erosion, this soil is poorly suited to cultivated crops. It is suited to hay and to permanent pasture of grasses and legumes. Erosion is a serious hazard when areas are reseeded or unless an adequate plant cover is maintained. Grazing should be regulated to maintain enough vegetation to control erosion and reduce soil compaction. If plowed when sticky and wet, the soil is cloddy. Using no-till or trash-mulch seeding methods to reseed meadows reduces the risk of erosion. Growth of pasture plants is limited during dry periods in summer. Applications of barnyard manure improve tilth and the water-holding capacity.

This soil is suited to trees and other vegetation grown as wildlife habitat. Seedling mortality is a hazard during dry periods.

The slope, the slow permeability, and the shrink-swell potential moderately limit this soil as a site for buildings and sanitary facilities. Local roads can be improved by providing suitable base material to overcome the risk of damage caused by low strength. The clay loam surface layer and the slope limit most recreation uses. Maintaining a plant cover on the site reduces the risk of erosion during construction. Capability subclass VIe; woodland suitability subclass 2c.

OcA—Ockley loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on low lying and high stream terraces and on outwash plains. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is dark brown, friable loam about 8 inches thick. The subsoil is about 47 inches thick. The upper part is dark brown, firm clay loam; the lower part is mostly dark yellowish brown and brown, firm and very firm gravelly clay loam and gravelly sandy clay loam. The substratum to a depth of about 73 inches is mainly gray, loose gravelly loamy sand.

Included with this soil in mapping are small areas of Eldean soils where sand and gravel are at a depth of 20 to 40 inches. In some areas on outwash plains, the substratum has thin layers of silt loam, sandy loam, or loam. These areas are not so good as a source of sand and gravel. Also included are narrow strips where slopes are 2 to 6 percent and small areas where the surface layer is sandy loam.

Permeability is moderate in the subsoil and very rapid in the substratum. The root zone is deep and has a moderate or high available water capacity. Runoff is slow. Tilth is good. The shrink-swell potential is moderate in the subsoil and low in the substratum. Reaction ranges from strongly acid to slightly acid in the upper part of the subsoil and from medium acid to mildly alkaline in the lower part. It varies widely in the surface layer, depending on past liming practices. Organic-matter content is moderate.

This soil is used mainly for cash grain farming, for which it has good potential. It also has good potential for building site development, recreation uses, and woodland.

This soil is suited to all of the crops commonly grown in the county. It is well suited to row crops grown year after year and to specialty crops. It can be tilled and grazed early in spring and is well suited to irrigation. The main management concerns are maintaining high fertility and good soil structure. Managing crop residue and planting cover crops commonly conserve moisture and maintain organic-matter content and tilth. Minimum tillage is beneficial.

This soil is well suited to trees. Seedlings are easy to establish. Plant competition can be reduced by mowing, disking, and spraying.

Even though the shrink-swell potential and the low strength are moderate limitations, this soil is suited to building site development. These limitations can be partly overcome by extending foundations to the underlying sand and gravel and by backfilling with suitable material. Local roads can be improved by providing suitable base material. The possible contamination of ground water limits some sanitary facilities. This soil is well suited to recreation uses. It is a good source of sand and gravel. Capability class I; woodland suitability subclass 1o.

OcB—Ockley loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on stream terraces, outwash plains, and, in a few areas, on end moraines. Most areas are long and narrow, oblong, or irregularly shaped. They range from 2 to 20 acres in size.

Typically, the surface layer is dark brown, friable loam about 7 inches thick. The subsoil is about 46 inches thick. The upper part is firm, dark brown clay loam; the lower part is dark yellowish brown and brown, very firm and firm fine gravelly sandy clay loam and fine gravelly clay loam and a thin layer of fine gravelly sandy clay. The substratum to a depth of about 72 inches is gray, loose fine gravelly loamy sand.

Included with this soil in mapping are small areas of Eldean soils where sand and gravel are at a depth of 20 to 40 inches. In some included areas on outwash plains, the substratum has layers of silt loam, sandy loam, or loam. These areas are not so good as a source of sand and gravel. Also included are a few small areas where the surface layer is sandy loam, narrow strips where slopes are 6 to 12 percent, and small areas of eroded soils on the upper part of slopes. Tilth is fair in the eroded soils.

Permeability is moderate in the subsoil and very rapid in the substratum. The root zone is deep and has a moderate or high available water capacity. Runoff is medium. Tilth is good. The shrink-swell potential is moderate in the subsoil and low in the substratum. Reaction ranges from strongly acid to slightly acid in the upper part of the subsoil and from medium acid to mildly alkaline in the lower part. It varies widely in the surface layer, depending on past liming practices. Organic-matter content is moderate.

This soil is used mainly for cash grain farming, for which it has good potential. It also has good potential for building site development, recreation uses, and woodland.

This soil is suited to corn, soybeans, wheat, oats, hay, pasture, and specialty crops. Row crops can be grown year after year if erosion is controlled. The soil dries early in spring and is well suited to tillage and grazing early in spring. It is suited to irrigation and minimum tilpending on past liming practices. Organic-matter content is very high.

This soil is used mainly for farming, specialty crops, woodland, and habitat for wildlife. It has fair potential for farming. The potential for building site development, sanitary facilities, and recreation uses is poor. Undrained areas have good potential as habitat for wetland wildlife.

The very poor natural drainage and flooding are the

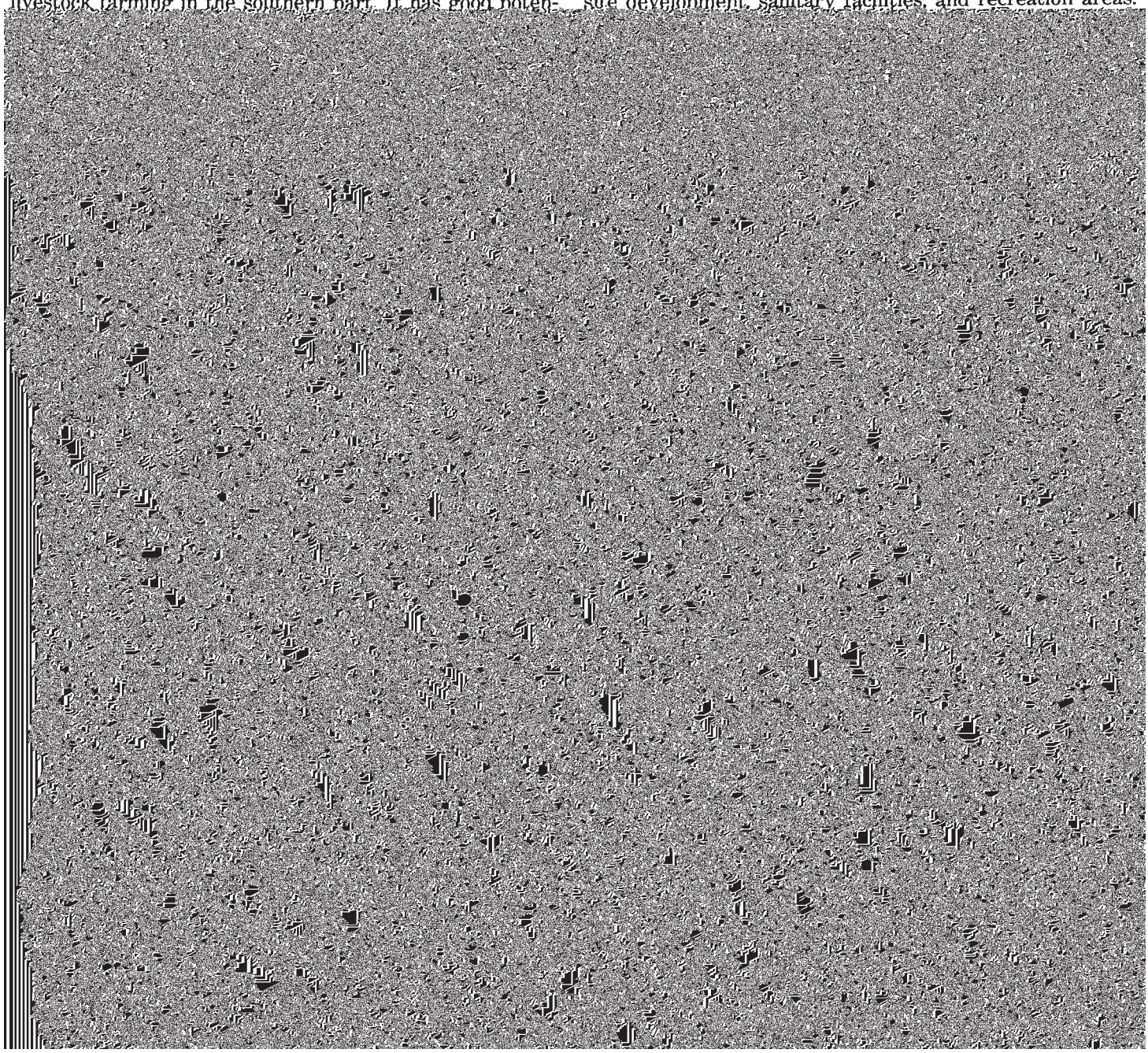
The seasonal high water table is near the surface in winter and in spring and other extended wet periods. Permeability is moderately slow. The rooting depth is influenced by the water table. The root zone is deep and has a high available water capacity. The soil puddles and clods easily. Because of the position on the landscape, some areas receive runoff from adjacent soils. Runoff is very slow. The shrink-swell potential is moderate. The surface layer is slightly acid to neutral, and the subsoil is slightly acid to mildly alkaline. Organic-matter content is high.

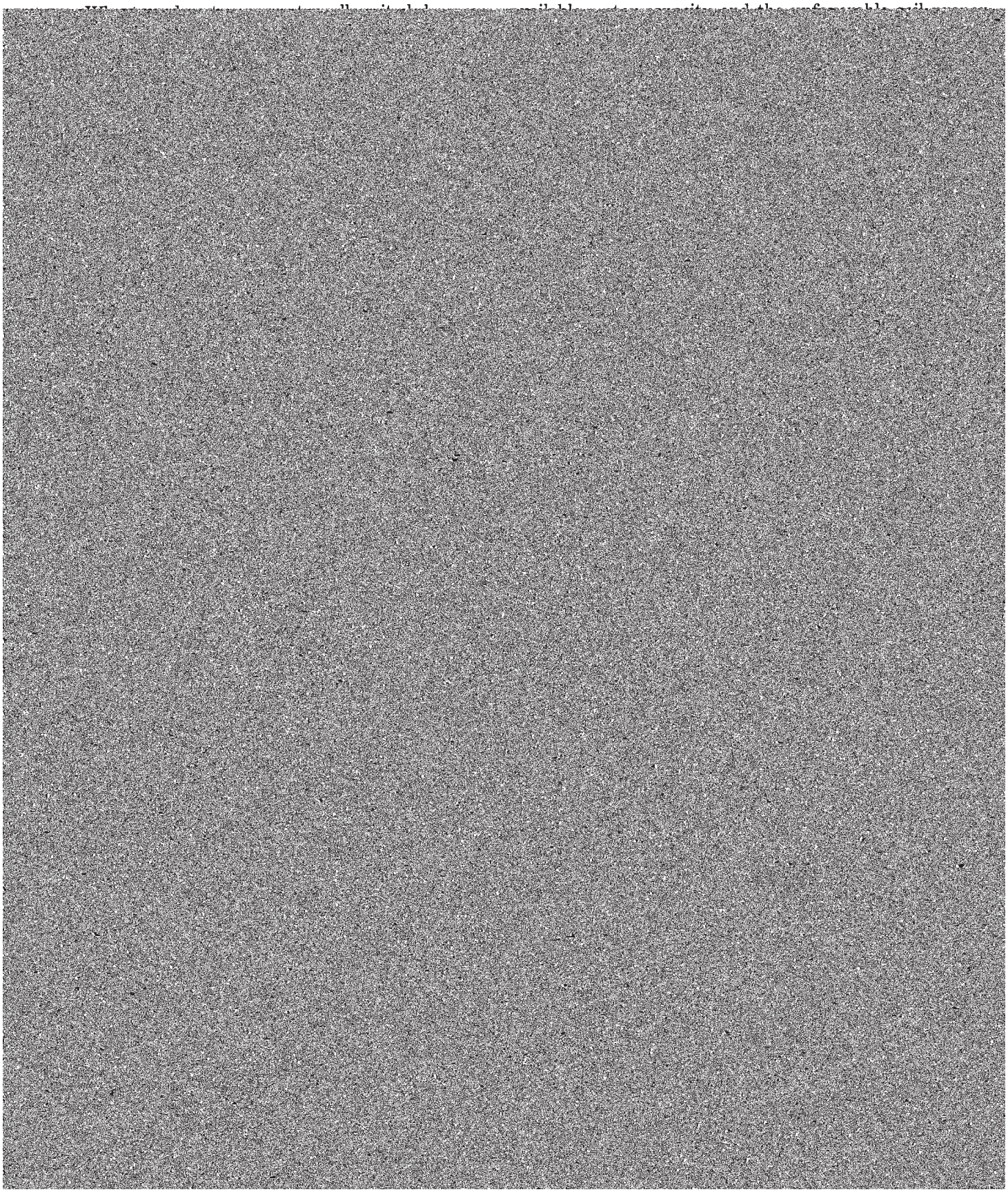
This soil is used mainly for cash grain farming in the northern part of the county and for cash grain and livestock farming in the southern part. It has good poten-

The rooting depth is influenced by the water table. The root zone is deep and has a high available water capacity. The soil puddles and clods easily. The shrink-swell potential is moderate. Reaction is slightly acid to neutral in the surface layer and slightly acid to mildly alkaline in the subsoil. Organic-matter content is high.

Most of the acreage is used as woodland and as habitat for wildlife. Some areas near Grand Lake St. Marys are filled and used as sites for mobile homes and cottages. This soil has poor potential for most uses but has better potential for wetland wildlife habitat.

The ponded water and the seasonal high water table severely limit the use of this soil for farming, building site development, sanitary facilities, and recreation areas.





Local roads can be improved by providing suitable base material. This soil is well suited to such recreation areas as picnic areas, golf courses, and hiking trails. Capability subclass IIe; woodland suitability subclass 2o.

Sh—Shoals silt loam. This deep, level and nearly level, somewhat poorly drained soil is on flood plains. It occupies the entire flood plain along some small streams. Along the larger streams, it is in low lying areas near slope breaks to the uplands. It is commonly flooded for brief periods in fall, winter, and spring. Slopes range from 0 to 2 percent. Areas are broad, long and narrow, or irregularly shaped. They range from 3 to 150 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil is about 39 inches thick. The upper part is dark gray and dark yellowish brown, mottled, friable silt loam; the lower part is grayish brown, mottled, friable silt loam. The substratum to a depth of about 65 inches is light gray, stratified silt loam and loam. In some small areas the surface layer is loam or silty clay loam.

Included with this soil in mapping are small areas of Sloan soils in depressions and old stream channels and narrow strips of Eel soils adjacent to small streams. Also included are some areas where, as a result of organic material in the lower part of the subsoil, strength is low and narrow strips where slopes are 2 to 5 percent.

The seasonal high water table is between depths of 12 and 36 inches in winter and in spring and other extended wet periods. Permeability is moderate. The rooting depth is influenced by the water table. The root zone is deep and has a high available water capacity. Crusting of the surface layer after heavy rains reduces the infiltration rate. Runoff is very slow. The shrink-swell potential is low. The surface layer and subsoil are slightly acid to mildly alkaline. Organic-matter content is moderate.

Most of the acreage is used for cash grain farming. Some areas on narrow flood plains are used for hay or permanent pasture. This soil has good potential for farming and woodland and poor potential for building site development and sanitary facilities.

Flooding and seasonal wetness are limitations to farming. They delay planting in most years and limit the choice of crops. This soil is suited to corn and soybeans that can be planted after the major threat of flooding. Such crops as winter wheat can be severely damaged by floodwater. Subsurface drainage is needed, but suitable outlets are not available in some areas. The soil is suited to Diking to control flooding is generally difficult. The soil has potential for such recreation uses as hiking during the drier part of the year. Capability subclass IIw; woodland suitability subclass 2o.

So—Sloan silty clay loam. This deep, level and nearly level, very poorly drained soil is on flood plains. It commonly occupies the entire flood plain along small streams. Along the larger streams, it is in depressional areas near slope breaks to the uplands. It is frequently flooded for brief periods in winter and spring. Slopes range from 0 to 2 percent. Most areas are broad, long and narrow, or irregularly shaped and range from 8 to several hundred acres in size.

Typically, the surface layer is very dark gray, friable silty clay loam about 9 inches thick. The subsurface layer is very dark gray, mottled, friable silty clay loam about 6 inches thick. The subsoil is about 30 inches thick. The upper part is dark gray and gray, mottled, firm silty clay loam; the lower part is gray, mottled, friable clay loam. The substratum to a depth of about 60 inches is gray, mottled, friable, stratified loam, silt loam, silty clay loam, and sandy loam. In some small areas the surface layer is silt loam, and in other areas the surface layer and subsurface layer are thinner.

Included with this soil in mapping are narrow strips of Shoals soils on very slight rises. Also included are small areas of Wabasha soils, which dry more slowly in spring than this Sloan soil.

The seasonal high water table is near the surface in winter and in spring and other extended wet periods. Permeability is moderate or moderately slow. The rooting depth is influenced by the water table. The root zone is deep and has a high available water capacity. Tilth is fair. Runoff is very slow, and the soil is subject to ponding. The shrink-swell potential is moderate in the subsoil and low in the substratum. Reaction is slightly acid to mildly alkaline in the surface layer and the upper part of the subsoil and neutral to moderately alkaline in the lower part of the subsoil. Organic-matter content is high.

Most of the acreage is used for row crops, pasture, and woodland. The potential for farming and woodland is good. The potential for building site development, sanitary facilities, and recreation uses is poor.

Flooding and seasonal wetness limit the use of this soil for farming. Winter crops and early spring crops are usually not grown because of the flood hazard. Drained areas are suited to row crops and pasture. Surface drains

This soil is suited to trees and other vegetation grown as habitat for wildlife. Harvesting equipment is limited during wet periods. Species that can tolerate wetness should be selected for reforestation. Spraying, mowing, and disking reduce plant competition.

The flood hazard, the prolonged wetness, and the moderate or moderately slow permeability severely limit this soil as a site for buildings, sanitary facilities, and recreation uses. Capability subclass IIIw; woodland suitability subclass 2w.

Ud—Udorthents, loamy. These soils are mainly in areas of cut and fill, where the cuts have been deep enough to remove all or nearly all of the surface layer and subsoil and the fill material is more than 20 inches deep over the original soil. Some areas have been filled or covered artificially with miscellaneous material, such as household or factory waste products. Some areas have been covered with earthy material. A few are borrow pits where the remaining material is typically similar to the material in the subsoil or substratum of adjacent soils. Slopes range from 0 to 25 percent.

Available water capacity is mainly very low, but it varies. Tilth is poor. Hard rains tend to seal the soil surface and thus reduce the infiltration rate and restrict the

slow, and water ponds in most areas after floodwater has receded. The shrink-swell potential is high. The surface layer and subsoil range from slightly acid to mildly alkaline. Organic-matter content is moderate or high.

Most of the acreage is used for cash grain farming. Some areas are used for permanent pasture or woodland. This soil has good potential for farming and fair potential for woodland. The potential for building site development, sanitary facilities, and recreation uses is poor.

This soil is suited to row crops, such as corn and soybeans, that can be planted after the period of most spring floods. It is not well suited to specialty crops or other crops that can be severely damaged by floodwater. Shallow surface drains remove ponded water. Subsurface drains can lower the water table if outlets are available. Suitable outlets are not available in many places. Timely tillage is important because the soil puddles and clods if worked when wet and sticky. Cover crops help maintain organic-matter content, improve tilth, and protect the surface during floods. Water-tolerant grasses and legumes are more suitable for pasture and hay than other plants. Controlled grazing reduces compaction and helps to prevent damage to pasture plants.

This soil is suited to woodland. Species selected for

presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

EARL V. SCOTT, district conservationist, and VAUGHN L. SIEGENTHALER, soil scientist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

More than 243,000 acres in the survey area was used for crops and pasture in 1967, according to the Conserva-

The potential of the soils in Mercer County for increased production of crops is good. About 23,000 acres of potentially good cropland is currently used as woodland and about 13,000 acres as pasture. In addition to the reserve capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

The acreage in crops and pasture in this county has not been affected by the use of land for urban development. In 1967, an estimated 15,000 acres of urban and built-up land was in the county. The acreage of such land has been growing at the rate of about 400 acres per year (*4*). The use of this soil survey to help make land-use decisions that will influence the future role of farming in the county is described in the section "General soil map for broad land-use planning."

Soil erosion is the major problem on slightly less than half of the cropland and pasture in Mercer County. If the slope is more than 2 percent, erosion is a hazard. Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils with a clayey subsoil, such as Blount and McGary soils. Erosion also reduces productivity on soils that tend to be droughty, such as Eldean soils. Second, soil erosion on farmland results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Soil erosion and wetness are limitations on some soils in the county, especially on the Blount, Digby, Haskins, and McGary soils that have slopes of 2 to 6 percent.

In eroded spots in many gently sloping and sloping fields, preparing a good seedbed and tilling are difficult because the original friable surface soil has been eroded away. Such spots are common where the moderately eroded Glynwood and Morley soils and the severely eroded Morley soils occur.

Erosion control provides protective surface cover, reduces runoff, and increases the infiltration rate. A cropping system that keeps plant cover on the soil for extended periods can hold soil erosion losses to an amount that will not reduce the productive capacity of the soils. On livestock farms, on which pasture plants and hay are grown, legume and grass forage crops in the cropping system reduce the risk of erosion, provide nitrogen, and improve tilth.

Slopes are so short and irregular that contour tillage or

vey area but are less successful on eroded soils, especially on severely eroded soils. No-tillage for corn, which is common on an increasing acreage, is effective in reducing the risk of erosion on sloping soils and can be adapted to many of the soils in the survey area. It is less successful, however, on severely eroded soils.

Although terraces and diversions shorten the length of slopes, slow runoff, and reduce the risk of erosion, the soils in Mercer County are less well suited to terraces and diversions because slopes are irregular, the terrace channel is excessively wet, and the clayey subsoil would be exposed in terrace channels.

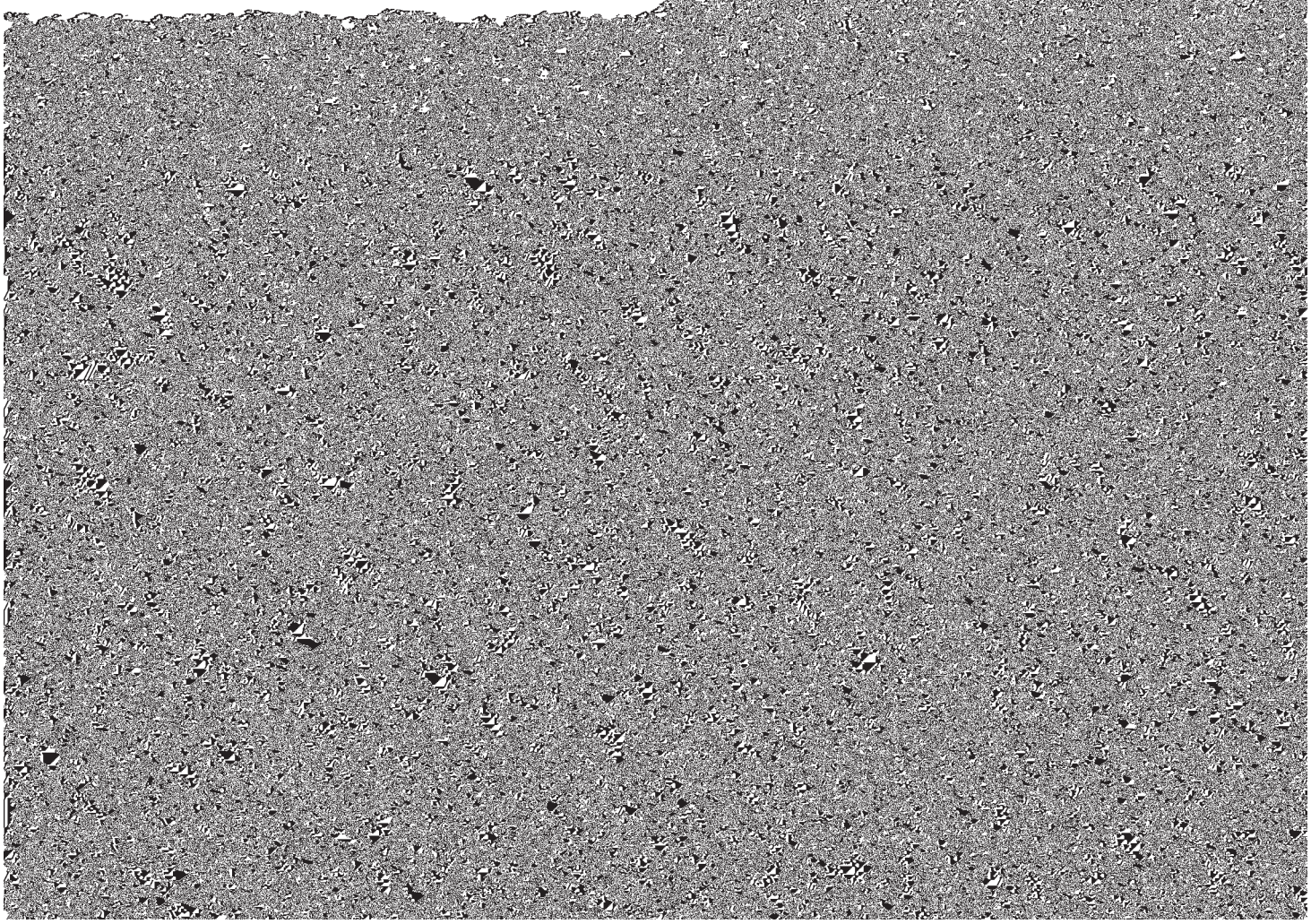
Grassed waterways are natural or constructed outlets or waterways protected by a grass cover (fig. 8). Natural drainageways are the best locations for waterways and often require a minimum of shaping to produce a good channel. They should be wide and flat so that farm machinery can cross them easily.

Contouring and contour stripcropping are helpful in controlling erosion. Because they are best suited to soils with smooth, uniform slopes, however, their use is limited in Mercer County, where slopes are generally irregular. In some areas contouring and even contour stripcropping

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and subsurface drainage is needed in most areas of the very poorly drained soils used intensively for row crops. Drains should be more closely spaced in slowly or very slowly permeable soils than in the more permeable soils. Subsurface drainage is slow in Montgomery soils. Finding adequate outlets for tile drainage systems is difficult in many areas of Montgomery, Sloan, Wabasha, Defiance, and Shoals soils. Subsurface drainage systems are difficult to establish in Millsdale soils because bedrock is 20 to 40 inches from the surface.

Organic soils oxidize and subside when the pore space is filled with air; therefore, special drainage systems are needed to control the depth and the period of drainage. Keeping the water table at the level required by crops during the growing season and raising it to the surface during other parts of the year minimize the oxidation and subsidence of organic soils. Information about the design of drainage systems for each kind of soil is contained in the Technical Guide, available in the local office of the Soil Conservation Service.

Soil fertility is naturally low in many soils on the uplands in the survey area. All soils that have a light



Fall plowing is generally not a good practice on the soils with a light colored silt loam surface layer because of crusting during winter and spring. Many of these soils are nearly as dense and hard at planting time after fall plowing as they were before plowing. In addition, soils with slopes of 2 percent or more are subject to damaging erosion if they are plowed in the fall.

The Millgrove, Millsdale, Montgomery, Pewamo, Sloan, wood and Morley soils, are commonly eroded and low in fertility, and less water is available to plants because runoff is rapid. Forage production on these soils is less. Growth is good on the gently sloping Blount, Digby, Haskins, McGary, Rawson, and Glynwood soils, but these soils are subject to erosion if the plant cover is damaged by overgrazing. Severe soil compaction occurs if grazing livestock are allowed to trample the soils during wet

appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

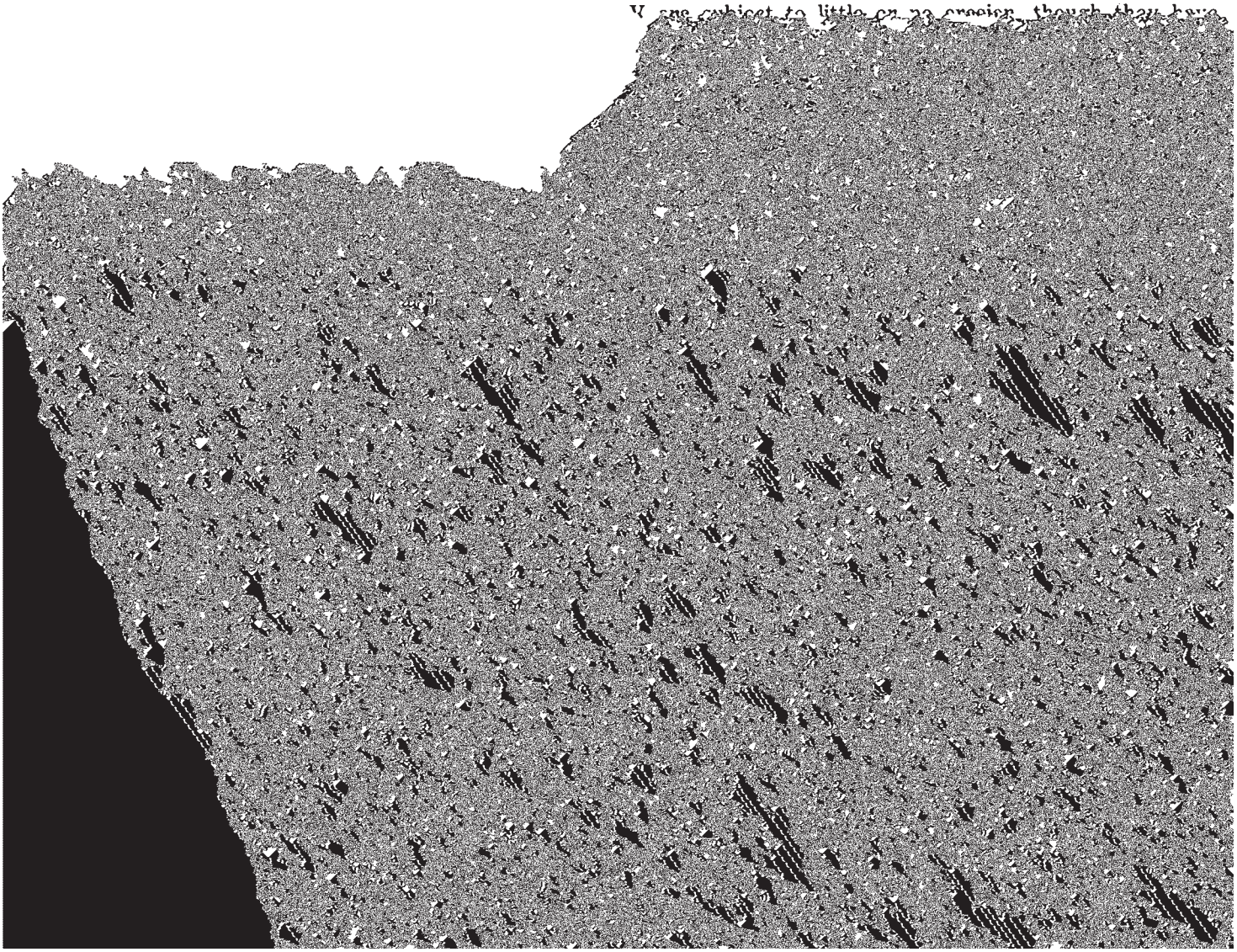
Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

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 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have



The first part of the *ordination symbol*, a number, in-

woodland managers generally favor in intermediate or im-

tures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

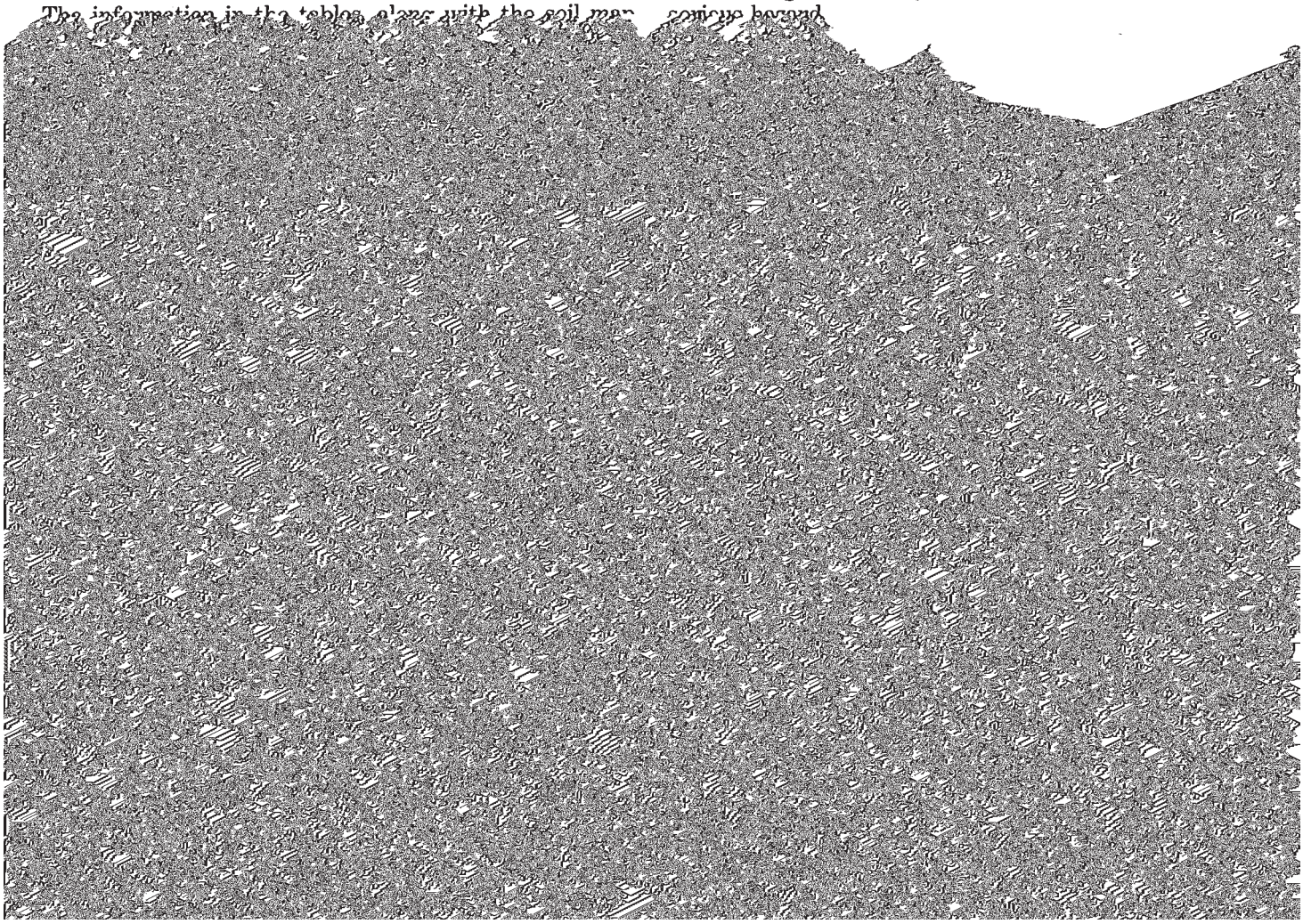
The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities. Table 11, shows the kind of limitations for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a

comes beyond



soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which respectively mean about the

above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-

The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water-control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of

this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once dur-

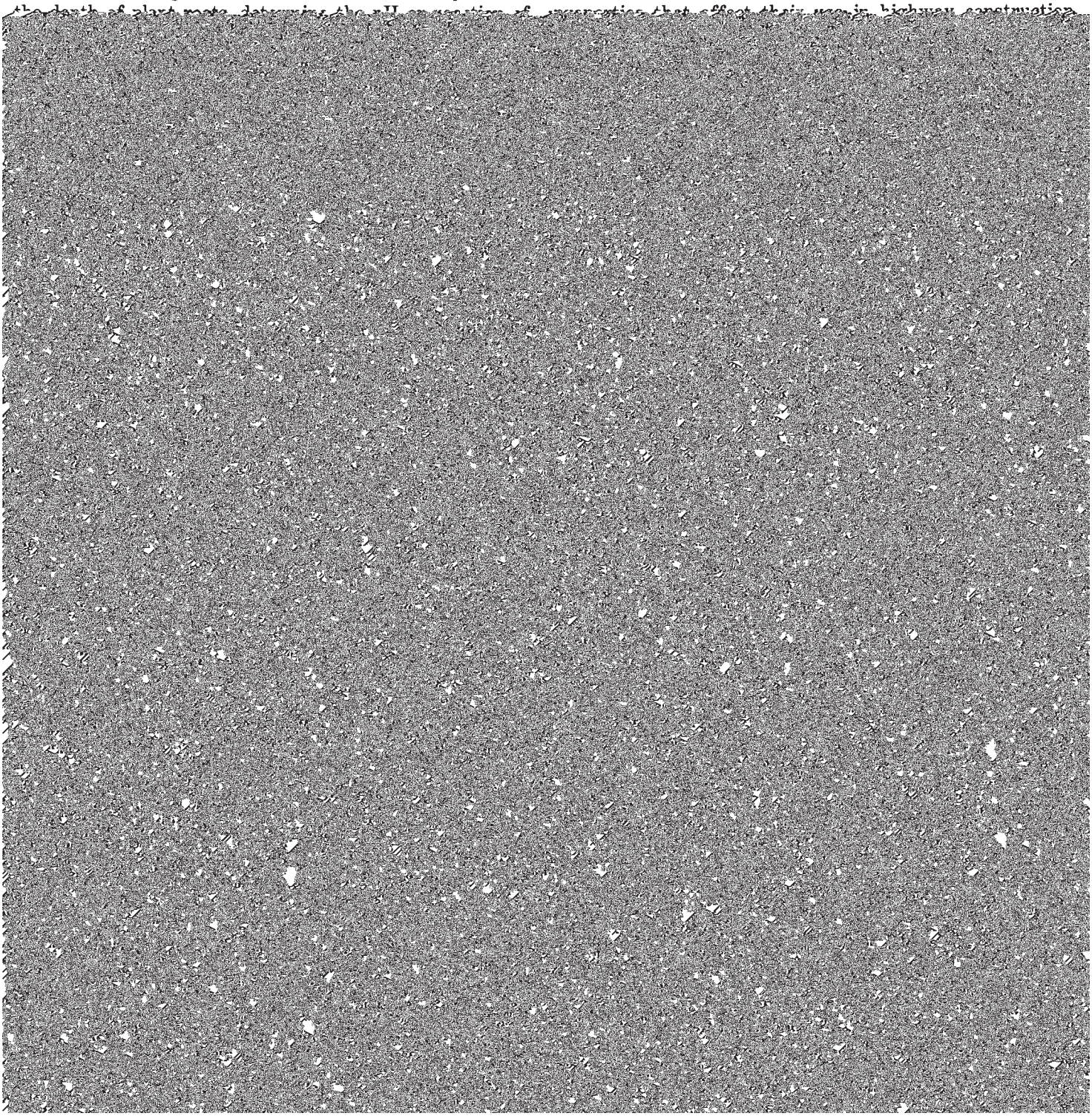
for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management and satisfactory results can be expected if

ing shrubs that are commercially available and suitable for planting on soils rated *good* are shrub honeysuckle, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous

They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH, [illegible] properties that affect their use in highway construction.



into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those

each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods

formation is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most impor-

Defiance (MC-16), Elliott (MC-13), McGary (MC-22), and Montgomery (MCi21).

In addition to Mercer County data, laboratory data are also available from nearby counties in western Ohio that have many of the same soils. All data are on file at the Department of Agronomy, OARDC, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Lands and Soil, Columbus, Ohio; and the Soil Conservation Service, State Office, Columbus, Ohio. Some of these data have been published in special studies of soils in nearby counties (*9*, *13*).

Engineering test data

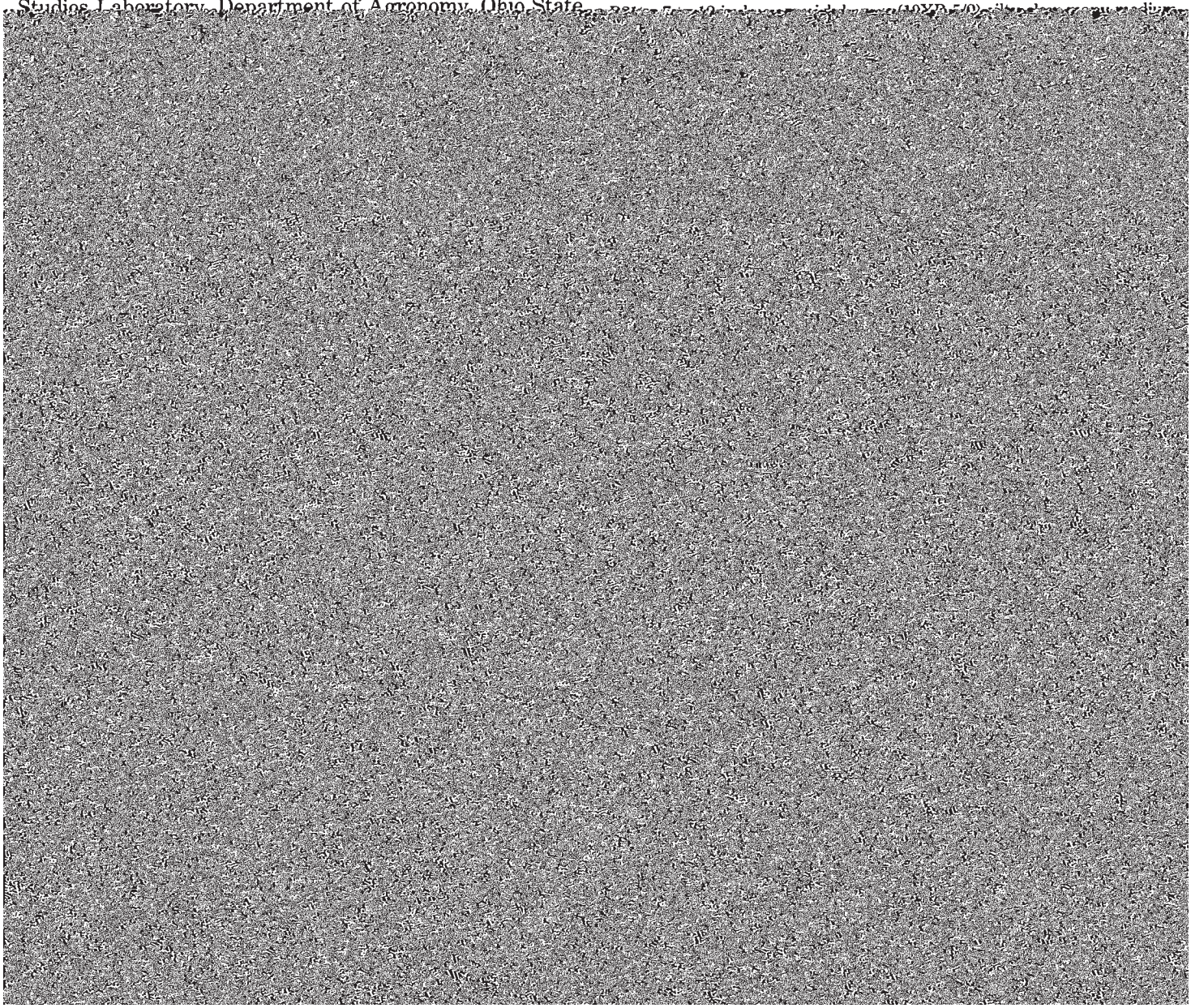
Several of the soils in Mercer County have been analyzed for engineering properties by the Soil Physical Studies Laboratory, Department of Agronomy, Ohio State

ble soils formed in glacial till. These soils are on ground moraines and end moraines. Slope ranges from 0 to 6 percent.

Blount soils are commonly adjacent to Elliott, Glynwood, Morley, and Pewamo soils and are similar to McGary soils. Elliott and Pewamo soils have a mollic epipedon. Glynwood and Morley soils are better drained than Blount soils. McGary soils formed in lacustrine deposits of clay and silt.

Typical pedon of Blount silt loam, 2 to 6 percent slopes, in Washington Township, SE1/4NE1/4 sec. 3, T. 6 S., R. 1 E., 760 feet north and 130 feet west of the intersection of Burrville Road and State Route 29:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; common roots; 3 percent coarse fragments; slightly acid; abrupt smooth boundary.



Carlisle soils are similar to Edwards and Olentangy soils and are commonly adjacent to Montgomery and Pewamo soils. Edwards soils are underlain with marl at a depth of 16 to 35 inches. Olentangy soils formed in coprogenous earth over lacustrine material or glacial till. Montgomery and Pewamo soils have a mollic epipedon. In addition, Montgomery soils formed in lacustrine sediments and Pewamo soils in glacial till.

Typical pedon of Carlisle muck, in Blackcreek Township, SE1/4SE1/4 sec. 18, T. 4 S., R. 1 E., 577 feet west and 200 feet north of the intersection of Duck Creek Road and State Route 49:

Ap—0 to 10 inches; dark gray (10YR 4/1) silty clay; weak medium subangular blocky structure; firm; many fine roots; neutral; abrupt smooth boundary.

A12—10 to 20 inches; dark gray (10YR 4/1) silty clay; few fine faint dark grayish brown (10YR 4/2) mottles; moderate fine and medium subangular and angular blocky structure; firm; many fine roots; thin continuous very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) vertical and horizontal coatings on faces of peds; neutral; clear wavy boundary.

B21g—20 to 27 inches; gray (10YR 5/1) silty clay; many fine distinct dark brown (10YR 4/3) mottles; weak medium subangular blocky structure; firm; common fine roots; medium continuous grayish brown (10YR 5/2) vertical and horizontal coatings on faces of peds; few fine dark brown (7.5YR 3/2) iron and manganese concretions; neutral; clear wavy boundary.

B22—27 to 44 inches; yellowish brown (10YR 5/4) silty clay; common

B1g—8 to 14 inches; grayish brown (10YR 5/2) loam; common medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; common fine roots; 2 percent fine gravel; slightly acid; clear wavy boundary.

B21tg—14 to 24 inches; grayish brown (10YR 5/2) clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; firm; common fine roots; thin patchy brown (10YR 4/3) clay films on vertical and horizontal faces of peds; 2 percent fine gravel; slightly acid; gradual smooth boundary.

B22t—24 to 36 inches; dark yellowish brown (10YR 4/4) clay loam; many medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; thin patchy brown (10YR 4/3) clay films on vertical and horizontal faces of peds; 5 percent fine gravel; neutral; gradual smooth boundary.

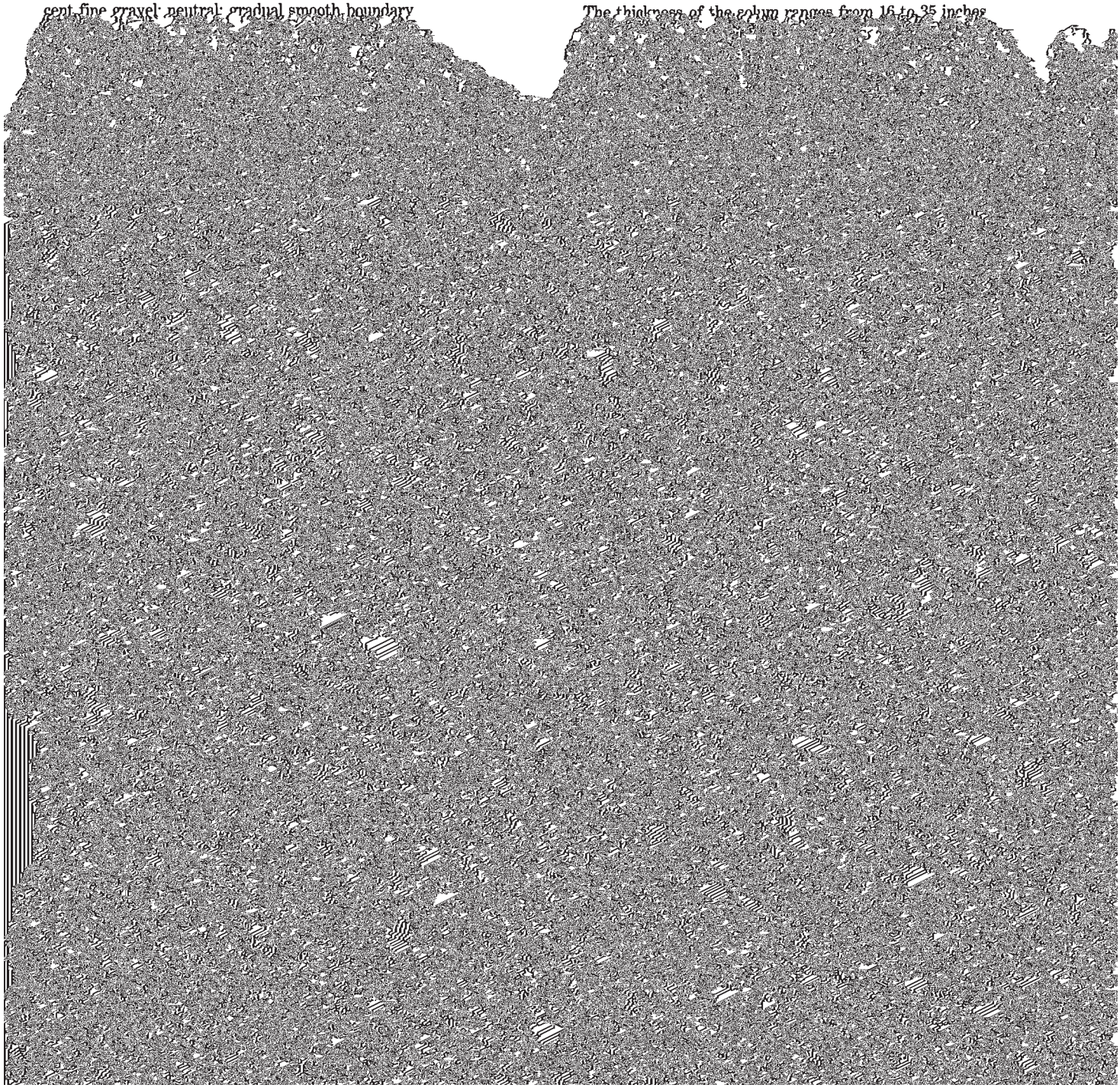
Oa3—14 to 20 inches; black (10YR 2/1) broken face and rubbed sapric material; about 3 percent fiber, 1 percent rubbed; weak fine platy structure; very friable; few fine roots; neutral; gradual wavy boundary.

Oa4—20 to 28 inches; black (10YR 2/1) broken face and rubbed sapric material; about 2 percent fiber, 1 percent rubbed; weak medium platy structure; very friable; mildly alkaline; abrupt wavy boundary.

Lca1—28 to 47 inches; light gray (10YR 7/2) marl; common fine faint very pale brown (10YR 7/4) mottles; massive; friable; strong effervescence; moderately alkaline; diffuse wavy boundary.

Lca2—47 to 60 inches; light gray (10YR 7/1) marl; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 16 to 35 inches.



C—42 to 68 inches; dark gray (10YR 4/1) sandy loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak medium angular blocky structure; friable; mildly alkaline.

The thickness of the solum and the depth to carbonates range from 40 to 66 inches. The depth to carbonates commonly is about 50 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is slightly acid to mildly alkaline. The B horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4 and has mottles with chroma of 1 or 2 within a depth of 24 inches. It is silt loam, loam, or light silty clay loam. Reaction ranges from slightly acid to moderately alkaline. The C horizon is stratified silt loam, loam, or sandy loam. It is mildly alkaline or moderately alkaline.

Eldean series

The Eldean series consists of deep, well drained soils on stream terraces and on outwash terraces on end moraines. These soils formed in outwash material underlain by stratified sand and gravel at a depth of 20 to 40 inches. Permeability is moderate in the subsoil and rapid or very rapid in the substratum. Slope ranges from 2 to 12 percent.

Eldean soils are similar to Gallman, Ockley, and Rawson soils, but they contain more clay in the subsoil. Also, Gallman and Ockley soils have a thicker solum and Rawson soils have glacial till or lacustrine material in the lower part of the solum and in the substratum.

Typical pedon of Eldean loam, 2 to 6 percent slopes, in Granville Township, SE1/4SW1/4 sec. 19, T. 7 S., R. 2 E., 125 feet north and 1,565 feet west of the intersection of Lange Road and Post Road:

Ap—0 to 9 inches; brown (10YR 4/3) heavy loam; weak medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B21—9 to 16 inches; dark brown (7.5YR 4/4) clay; weak medium subangular blocky structure; firm, sticky; common roots; thin patchy brown (7.5YR 4/4) clay films on faces of peds; 10 percent gravel; neutral; clear wavy boundary.

B22t—16 to 22 inches; dark brown (7.5YR 4/4) clay; weak coarse subangular blocky structure; firm, sticky; common roots; medium patchy brown (7.5YR 4/2) clay films on faces of peds; 10 percent gravel; neutral; clear wavy boundary.

B23t—22 to 28 inches; dark brown (7.5YR 4/4) clay; weak coarse subangular blocky structure; firm, slightly sticky; few roots; medium very patchy brown (7.5YR 4/2) clay films on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

B24t—28 to 31 inches; brown (7.5YR 4/2) gravelly clay; weak medium subangular blocky structure; firm; few roots; few weathered limestone fragments; 25 percent fine gravel; mildly alkaline; clear wavy boundary.

B3—31 to 35 inches; brown (7.5YR 4/2) gravelly clay loam; weak medium and fine subangular blocky structure; friable; few roots; 40 percent fine gravel; slight effervescence; mildly alkaline; abrupt wavy boundary.

B32—35 to 37 inches; brown (7.5YR 4/2) gravelly loam; weak medium subangular blocky structure; very friable; 45 percent fine gravel; slight effervescence; mildly alkaline; abrupt wavy boundary.

IIC1—37 to 55 inches; grayish brown (10YR 5/2) fine gravelly loamy sand; single grained; loose; 35 percent fine gravel; slight effervescence; mildly alkaline; abrupt wavy boundary.

IIC2—55 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; 10 percent fine gravel; strong effervescence; moderately alkaline; clear wavy boundary.

IIC3—60 to 70 inches; yellowish brown (10YR 5/4) gravelly loamy sand;

The thickness of the solum ranges from 20 to 40 inches; it is commonly 30 to 40 inches. The content of coarse fragments generally increases with increasing depth; it ranges, by volume, from 0 to 10 percent in the Ap horizon, from 5 to 25 percent in the lower part of the B2 horizon, and from 10 to 60 percent in the B3 and C horizons.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is medium acid to neutral. The B2 horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. The fine earth texture is heavy clay loam, sandy clay, or clay. The B3 horizon has colors similar to those of the B2 horizon and has a fine earth texture of clay loam or loam. It is neutral to moderately alkaline. The C horizon has a fine earth texture of sand or loamy sand. It is neutral to moderately alkaline.

Elliott series

The Elliott series consists of deep, somewhat poorly drained, moderately slowly permeable soils on ground moraines. These soils formed in glacial till. Slope ranges from 1 to 4 percent.

Elliott soils are commonly adjacent to Blount, Glynwood, McGary, Montgomery, Morley, and Pewamo soils. Blount, Glynwood, McGary, and Morley soils do not have a mollic epipedon. Glynwood and Morley soils have a higher dominant chroma in the upper 10 inches of the argillic horizon than Elliott soils. McGary and Montgomery soils formed in lacustrine deposits of clay and silt. Pewamo and Montomery soils have a dominant low chroma in the subsoil.

Typical pedon of Elliott silt loam, 1 to 4 percent slopes, in Dublin Township, NE1/4NW1/4 sec. 27, T. 4 S., R. 2 E., 800 feet east and 4,070 feet north of the intersection of Lombard Road and State Route 707:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) heavy silt loam; moderate medium subangular blocky structure; friable; many fine roots; 1 percent coarse fragments; neutral; abrupt smooth boundary.

A12—8 to 11 inches; very dark grayish brown (10YR 3/2) heavy silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure parting to weak fine subangular blocky; friable; few roots; 2 percent coarse fragments; neutral; clear wavy boundary.

A13—11 to 14 inches; very dark grayish brown (10YR 3/2) heavy silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few roots; very dark gray (10YR 3/1) coatings on faces of peds; 2 percent coarse fragments; neutral; clear wavy boundary.

B1—14 to 18 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few roots; few very dark grayish brown (10YR 3/2) coatings on faces of peds; 3 percent coarse fragments; neutral; clear wavy boundary.

B21t—18 to 22 inches; yellowish brown (10YR 5/4) heavy silty clay loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to strong medium subangular blocky; firm; thin patchy dark gray (10YR 4/1) clay films on horizontal and vertical faces of peds; 3 percent coarse fragments; neutral; clear wavy boundary.

B22t—22 to 26 inches; brown (10YR 5/3) clay; few medium faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; very firm; thin continuous very dark gray (10YR 3/1) clay films on some vertical faces of peds; 5 percent coarse fragments; mildly alkaline; clear wavy boundary.

B3t—26 to 30 inches; yellowish brown (10YR 5/4) light silty clay; few fine faint yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure parting to moderate medium subangular blocky; very firm; thin patchy grayish brown (10YR 5/2) films on

C—30 to 60 inches; brown (10YR 4/3) clay loam; few fine faint brown (10YR 5/3) mottles; massive with weak structural breaks; very firm; thin patchy gray (10YR 6/1) coatings on vertical faces of peds; 10 percent coarse fragments; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 45 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is medium acid to neutral. It is 10 to 16 inches thick. The B horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is silty clay loam, silty clay, or clay. It is medium acid to neutral in the upper part and neutral or mildly alkaline in the lower part. The C horizon is silty clay loam or clay loam. It is mildly alkaline or moderately alkaline.

Gallman series

The Gallman series consists of deep, well drained or moderately well drained soils on stream terraces. These soils formed in poorly sorted outwash material having a high content of fine gravel. Permeability is moderately rapid. Slope ranges from 2 to 6 percent.

Gallman soils are commonly adjacent to Digby and Millgrove soils and are similar to Eldean, Ockley, and Rawson soils. Digby soils have a dominant chroma of 2 or less either on faces of peds or in one subhorizon of the argillic horizon. Eldean soils have a thinner solum than Gallman soils and contain more clay in the subsoil. Ockley soils have a thinner B3 horizon than Gallman soils, are shal-

IIB32t—52 to 66 inches; dark brown (10YR 3/3) gravelly sandy clay loam; massive; firm, sticky; patchy very dark grayish brown (10YR 3/2) bridging; 25 percent fine gravel, dominantly from black shale; neutral; gradual diffuse boundary.

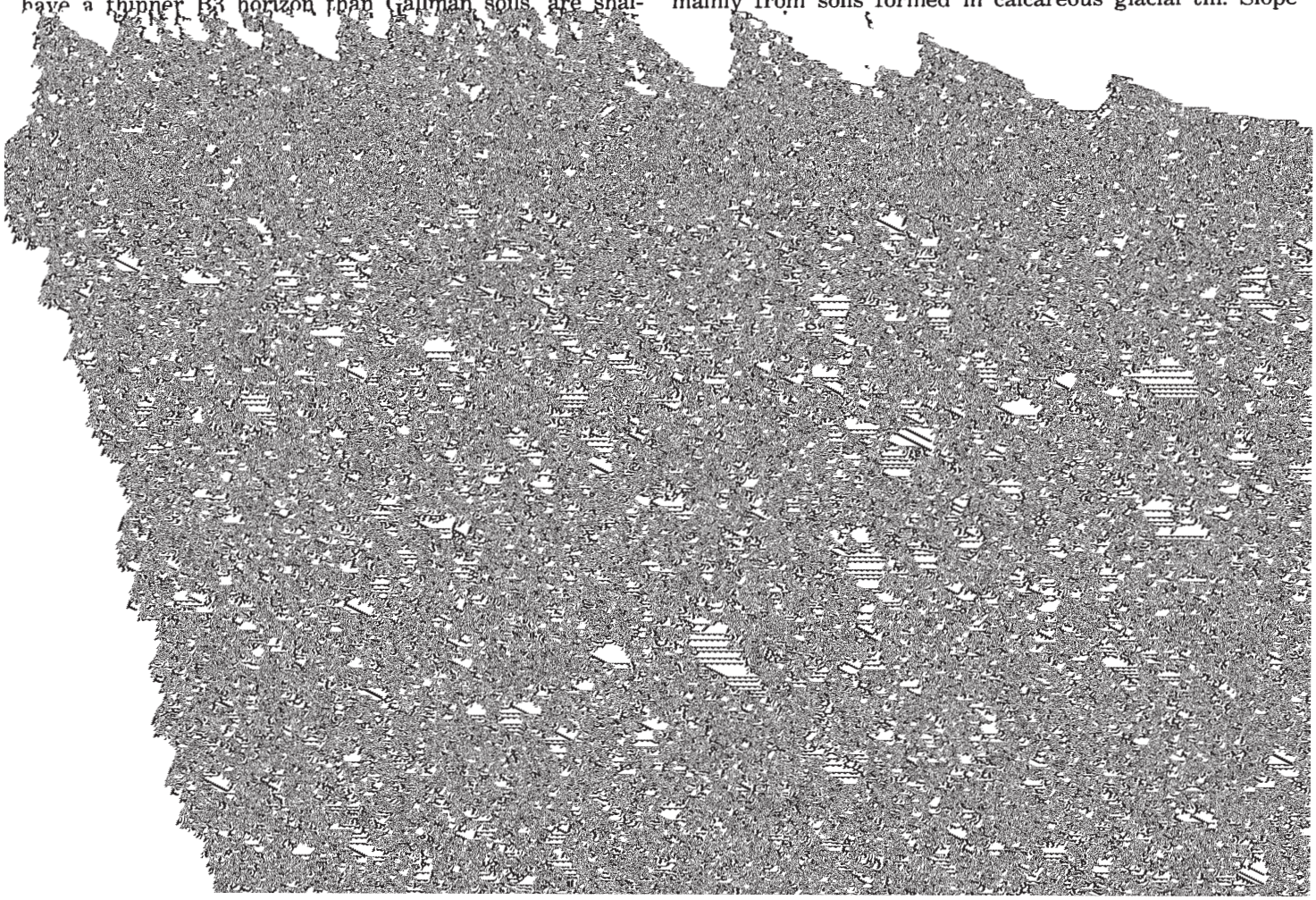
IIIB33—66 to 75 inches; dark brown (7.5YR 4/4) sandy loam; few fine faint strong brown (7.5YR 5/6) mottles; massive; friable; some thin clay bridging; 2 percent fine gravel; thin lenses of silt loam; neutral; abrupt wavy boundary.

The thickness of the solum and the depth to carbonates range from 55 to 115 inches. The content of coarse fragments, dominantly fine gravel, ranges from 0 to 10 percent in the A horizon and from 2 to 30 percent in the B horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is loam or sandy loam and is medium acid to neutral. A thin A2 horizon is in some pedons. The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam, sandy loam, sandy clay loam, clay loam, or the gravelly analogs of these textures. The B3 horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is sandy clay loam, sandy loam, loamy sand, or the gravelly analogs of these textures. Reaction ranges from slightly acid to mildly alkaline.

Genesee series

The Genesee series consists of deep, well drained, moderately permeable soils in the highest positions on flood plains. These soils formed in medium textured and moderately coarse textured recent alluvium washed mainly from soils formed in calcareous glacial till. Slope



The Ap horizon has hue of 10YR, value of 3 or 4, and chroma of 3. It is slightly acid or neutral. The B horizon has hue of 10YR, value of 4 or 7.5YR, value of 4 or 5, and chroma of 2 to 6. It is dominantly clay or silty clay, but it has subhorizons of heavy clay loam or heavy silty clay

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2. It ranges from strongly acid to neutral. The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is dominantly sandy clay loam and clay loam, but it has subhorizons of loam in some pedons. Reaction is strongly acid or medium acid in the upper part and medium acid to neutral in the lower part; the pH value generally increases with increasing depth. The IIB3 horizon has hue of 10YR, value of 5, and chroma of 2 or 3. It is clay loam, silty clay loam, silty clay, or clay. Reaction is neutral or mildly alkaline. The C horizon is clay loam, silty clay loam, or silty clay. It is dominantly mildly alkaline or moderately al-

C1g—41 to 49 inches; gray (10YR 5/1) silty clay; common coarse distinct yellowish brown (10YR 5/4) mottles; weak coarse platy structure; firm; thin patchy white (10YR 8/1) secondary lime coatings on fine cleavages; many fine and medium round, oval, and oblong light gray (10YR 7/1) and white (10YR 8/1) calcareous concretions; strong effervescence; moderately alkaline; gradual wavy boundary.

C2—49 to 65 inches; dark yellowish brown (10YR 4/4) silty clay; weak very coarse platy structure; very firm; thin patchy light gray (N 7/0) secondary lime coatings on vertical and horizontal surfaces; many fine and medium oval white (10YR 8/1) calcareous concre-

The thickness of the solum ranges from 42 to 54 inches. The content of coarse fragments ranges from 2 to 10 percent in the Ap horizon, from 5 to 20 percent in the B horizon, and from 10 to 50 percent in the C horizon.

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is medium acid to neutral. The B horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. It is clay loam, sandy clay, gravelly clay loam, gravelly sandy clay loam, or sandy clay loam. Reaction ranges from slightly acid to mildly alkaline. The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The fine earth texture is sandy loam, loam, or loamy sand. Reaction is mildly alkaline or moderately alkaline.

Millsdale series

The Millsdale series consists of moderately deep, very poorly drained, moderately slowly permeable soils on ground moraines. These soils formed in 20 to 40 inches of glacial till over limestone bedrock. Slope ranges from 0 to 2 percent.

Millsdale soils are similar to Millgrove and Pewamo soils, but they are shallower over bedrock than those soils. Also, Millgrove soils formed in outwash material and contain less clay in the argillic horizon.

Typical pedon of Millsdale silty clay loam, in Jefferson Township, SE1/4SW1/4 sec. 5, T. 6 S., R. 2 E., 740 feet west and 125 feet north of the intersection of Karch and Swamp Roads:

Ap1—0 to 5 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) rubbed; moderate medium granular structure; friable; common roots; 1 percent angular coarse fragments; neutral; abrupt smooth boundary.

Ap2—5 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) rubbed; weak coarse angular blocky structure; firm; common roots; 2 percent angular coarse fragments; neutral; clear smooth boundary.

B21t—10 to 13 inches; yellowish brown (10YR 5/4) heavy clay loam; many fine distinct dark gray (10YR 4/1) mottles; moderate fine an-

The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1. It is slightly acid or neutral. The B horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4. It is heavy silty clay loam or clay loam. Reaction is slightly acid or neutral in the upper part and neutral or mildly alkaline in the lower part.

Montgomery series

The Montgomery series consists of deep, very poorly drained soils in depressional areas in old shallow glacial lakes on till plains. These soils formed in calcareous, lacustrine, stratified silty clay, clay, or silty clay loam. Permeability is slow or very slow. Slope ranges from 0 to 2 percent.

Montgomery soils are similar to Pewamo, Millgrove, and Wabasha soils and are commonly adjacent to McGary soils. Pewamo soils formed in glacial till. McGary soils do not have a mollic epipedon or a dominant low chroma throughout the subsoil. Millgrove soils formed in outwash deposits and contain less clay in the subsoil than Montgomery soils. Wabasha soils are subject to frequent flooding and do not have a mollic epipedon. Also, the content of organic matter in Wabasha soils varies with increasing depth.

Typical pedon of Montgomery silty clay, in Granville Township, SE1/4NE1/4 sec. 32, T. 13 N., R. 3 E., 1,430 feet south and 1,585 feet west of the intersection of Watkins Road and U.S. Route 127:

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay; weak medium subangular blocky structure; friable; common roots; few fine yellowish brown (10YR 5/4) iron and manganese concretions; neutral; abrupt smooth boundary.

A12—9 to 11 inches; very dark gray (10YR 3/1) silty clay; weak coarse and medium subangular blocky structure; friable; common roots; few fine yellowish brown (10YR 5/4) iron and manganese concretions; neutral; clear wavy boundary.

B21g—11 to 18 inches; dark gray (10YR 4/1) silty clay; common fine

The thickness of the solum ranges from 26 to 60 inches. The mollic epipedon is 10 to 16 inches thick.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is slightly acid or neutral. The B horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. It is dominantly silty clay or silty clay loam, but some pedons have thin subhorizons of clay. Reaction ranges from slightly acid to mildly alkaline. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 0 to 2. It is silty clay, clay, or silty clay loam and is mildly alkaline or moderately alkaline.

Morley series

The Morley series consists of deep, well drained, slowly permeable soils formed in glacial till. These soils are on the dissected parts of ground moraines and end moraines. Slope ranges from 12 to 25 percent.

Morley soils are commonly adjacent to Blount, Elliott, and Glynwood soils and are similar to Rawson soils. In Blount and Elliott soils one or more subhorizons of the B horizon or the faces of peds in the argillic horizon have a dominant chroma of 2 or less. Also, Elliott soils have a mollic epipedon. Glynwood soils have mottles with chroma of 2 or less in the upper 10 inches of the argillic horizon. Rawson soils contain less clay in the argillic horizon than Morley soils and formed in outwash over glacial till or lacustrine material.

Typical pedon of Morley silt loam, 12 to 18 percent slopes, moderately eroded, in a meadow in Recovery,

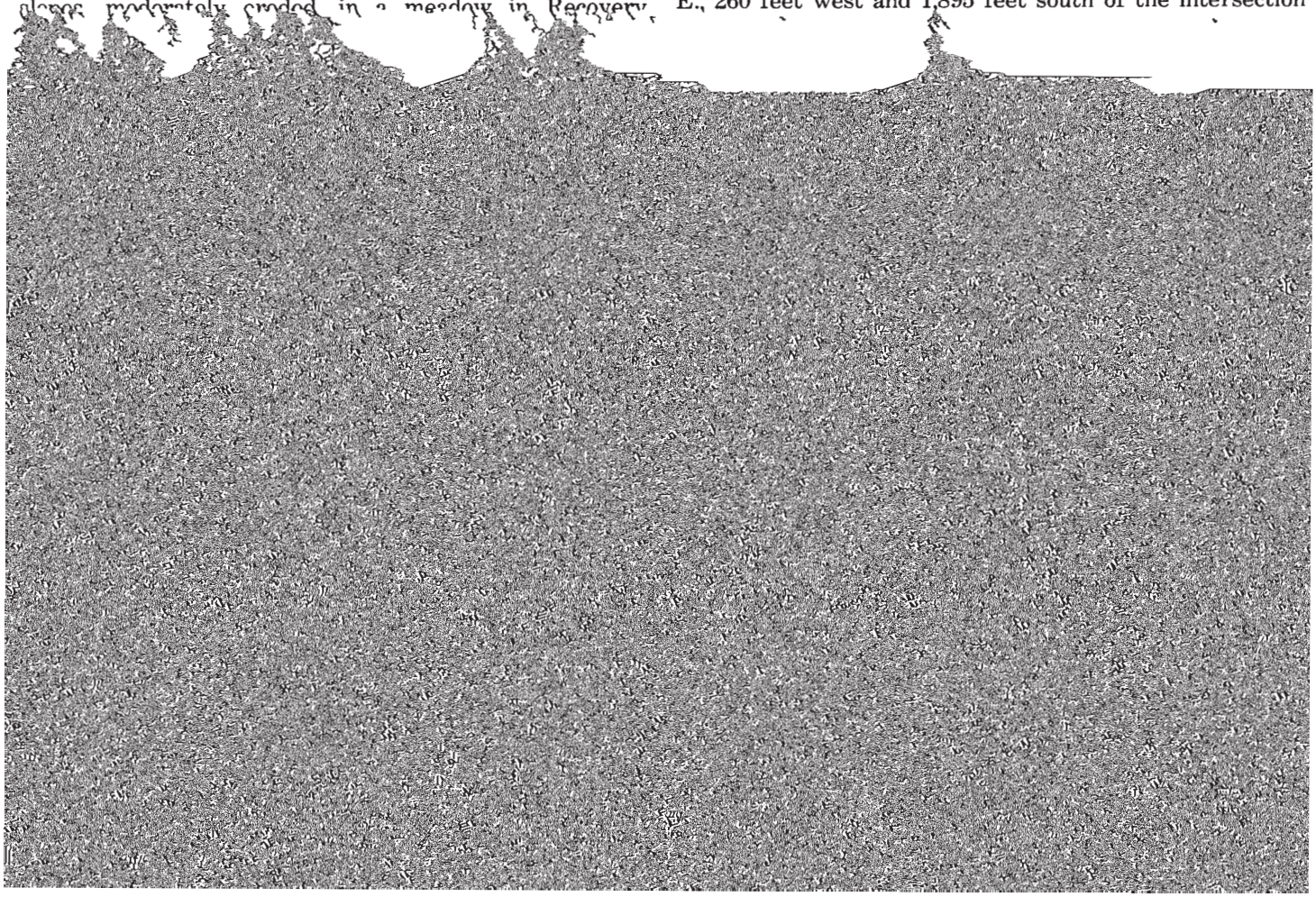
The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is silt loam or clay loam. It is strongly acid to slightly acid. The B horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is silty clay, clay, clay loam, or silty clay loam. It is strongly acid to neutral in the upper part and neutral to moderately alkaline in the lower part. The C horizon is clay loam or silty clay loam. It is mildly alkaline or moderately clkaline.

Ockley series

The Ockley series consists of deep, well drained soils on stream terraces and outwash plains. These soils formed in medium textured and moderately fine textured glacial outwash overlying stratified sand and gravel. Permeability is moderate in the subsoil and very rapid in the substratum. Slope ranges from 0 to 6 percent.

Ockley soils are similar to Eldean, Gallman, and Rawson soils. Eldean soils contain more clay in the subsoil than Ockley soils, have a thinner solum, and are 20 to 40 inches deep to sand and gravel. Gallman soils have a thicker solum than Ockley soils. Rawson soils have moderately fine textured and fine textured glacial till or lacustrine material in the lower part of the solum and in the substratum.

Typical pedon of Ockley loam, 2 to 6 percent slopes, in Washington Township, SE1/4NE1/4 sec. 15, T. 6 S., R. 1 E., 260 feet west and 1,895 feet south of the intersection



The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 3. It is slightly acid or medium acid. The upper part of the B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam or clay loam and is strongly acid or medium acid. The lower part has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 2 to 4. It is dominantly gravelly sandy clay loam or gravelly clay loam, but some pedons have subhorizons of fine gravelly sandy clay or gravelly sandy loam. Reaction in the lower part ranges from medium acid to mildly alkaline. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is gravelly loamy sand or gravelly sand. It is mildly alkaline or moderately alkaline.

Olentangy series

The Olentangy series consists of deep, very poorly drained soils in depressional areas associated mainly with glacial lakes on till plains. These soils formed in accumulated organic material, mainly coprogenous earth, over medium textured or moderately fine textured glacial till or lacustrine material. Permeability is moderate in the coprogenous earth and slow in the mineral material. Slope ranges from 0 to 2 percent.

Olentangy soils are similar to Carlisle and Edwards soils and are commonly adjacent to Montgomery soils. Carlisle soils formed in more than 51 inches of accumulated organic material. Edwards soils are underlain with marl at a depth of 16 to 35 inches. Montgomery soils have a mollic epipedon and formed in lacustrine sediments.

Typical pedon of Olentangy mucky silt loam, in Granville Township, NW1/4NW1/4 sec. 30, T. 13 N., R. 3 E., 1,550 feet west and 2,920 feet north of the intersection of Rose and Huwer Roads:

OAp—0 to 11 inches; black (10YR 2/1) mucky silt loam; moderate medium and coarse granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

OA12—11 to 15 inches; very dark grayish brown (10YR 3/2) mucky silt loam; 8 percent fiber, a trace rubbed; moderate thin platy and moderate medium subangular blocky structure; friable; common fine roots; common fine gypsum crystals; extremely acid; gradual wavy boundary.

IILco1—15 to 25 inches; brown (7.5YR 4/2) sedimentary peat; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common fine gypsum crystals on rind of prisms; extremely acid; gradual wavy boundary.

IILco2—25 to 34 inches; olive gray (5Y 4/2) sedimentary peat; weak coarse prismatic structure; friable; yellowish brown (10YR 5/6) linings along root channels; brown (10YR 4/3) rind, 10 millimeters thick, on prisms; common fine gypsum crystals on rind surfaces; extremely acid; gradual wavy boundary.

IILco3—34 to 40 inches; dark greenish gray (5GY 4/1) sedimentary peat; massive; friable; slightly acid; abrupt smooth boundary.

IIICg—40 to 60 inches; dark gray (5Y 4/1) silty clay loam; few fine faint olive brown (2.5Y 4/4) mottles; massive; friable; few white snail shells; slight effervescence; mildly alkaline.

The thickness of the coprogenous earth and the depth to lacustrine sediments or glacial till range from 24 to 50 inches.

The OA horizon ranges from extremely acid to strongly acid in unlimed areas. The Lco horizon has hue of 7.5YR to 5GY, value of 4 or 5, and chroma of 1 or 2. Reaction ranges from extremely acid to mildly alkaline. The IIIC horizon is silty clay loam or silt loam and is mildly alkaline or moderately alkaline.

Pewamo series

The Pewamo series consists of deep, very poorly drained, moderately slowly permeable soils on ground moraines and in narrow drainageways on end moraines. These soils formed in glacial till. Slope ranges from 0 to 2 percent.

Pewamo soils are commonly adjacent to Blount and Glynwood soils and are similar to Elliott, Millsdale, and Montgomery soils. Blount and Glynwood soils do not have a mollic epipedon. In addition, Glynwood soils have a higher dominant chroma in the subsoil than Pewamo soils. Blount and Elliott soils do not have a dominant low chroma in the subsoil. Millgrove soils formed in outwash material and contain less clay in the argillic horizon than Pewamo soils. Millsdale soils are underlain with limestone bedrock at a depth of 20 to 40 inches. Montgomery soils formed in lacustrine deposits.

Typical pedon of Pewamo silty clay loam, in Jefferson Township, NE1/4NW1/4 sec. 33, T. 5 S., R. 2 E., 2,230 feet north and 2,250 feet east of the intersection of Fairground Road and State Route 118:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium granular structure; firm; common roots; 2 percent coarse fragments; neutral; abrupt smooth boundary.

A12—7 to 13 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium subangular blocky structure; firm; common roots; 2 percent coarse fragments; neutral; clear wavy boundary.

B21gt—13 to 20 inches; dark gray (10YR 4/1) silty clay; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common roots; thin patchy (10YR 3/2) clay films on vertical faces of peds; 3 percent coarse fragments; neutral; gradual wavy boundary.

B22gt—20 to 31 inches; dark gray (10YR 4/1) clay; common medium distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; very firm; few roots; thin patchy (10YR 3/2) clay films on vertical and horizontal faces of peds; 4 percent coarse fragments; neutral; diffuse wavy boundary.

B23gt—31 to 50 inches; gray (10YR 6/1) clay; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few roots; thin patchy (10YR 4/2) clay films on vertical faces of peds; 5 percent coarse fragments; mildly alkaline; clear irregular boundary.

B3g—50 to 63 inches; gray (10YR 6/1) clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; very firm; 10 percent coarse fragments; slight effervescence; mildly alkaline; diffuse irregular boundary.

The thickness of the solum ranges from 36 to 70 inches. The depth to carbonates ranges from 36 to 56 inches. The content of coarse fragments ranges from 2 to 14 percent throughout the solum. The mollic epipedon is 10 to 14 inches thick.

The Ap and A12 horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2. They are silty clay loam or silty clay and are slightly acid or neutral. The B2t horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It has higher chroma mottles. Texture is clay, silty clay, or heavy silty clay loam. Reaction is slightly acid to mildly alkaline.

Rawson series

The Rawson series consists of deep, moderately well drained soils on stream terraces, end moraines, and ground moraines. These soils formed in moderately permeable, medium textured and moderately fine tex-

tured outwash over slowly permeable or very slowly permeable, moderately fine textured or fine textured glacial till or lacustrine material. Slope ranges from 2 to 6 percent.

Rawson soils are commonly adjacent to Haskins soils and are similar to Eldean, Gallman, Morley, and Ockley soils. Eldean, Gallman, and Ockley soils formed in glacial outwash and do not have contrasting fine textured or moderately fine textured glacial till or lacustrine material within a depth of 40 inches. The argillic horizon in Eldean and Morley soils contains more clay than that in Rawson soils. Haskins soils have a dominant chroma of 2 or less either on faces of peds or in one subhorizon of the argillic horizon. Morley soils formed in glacial till.

loam, silty clay loam, or silty clay. It is mildly alkaline or moderately alkaline.

Shoals series

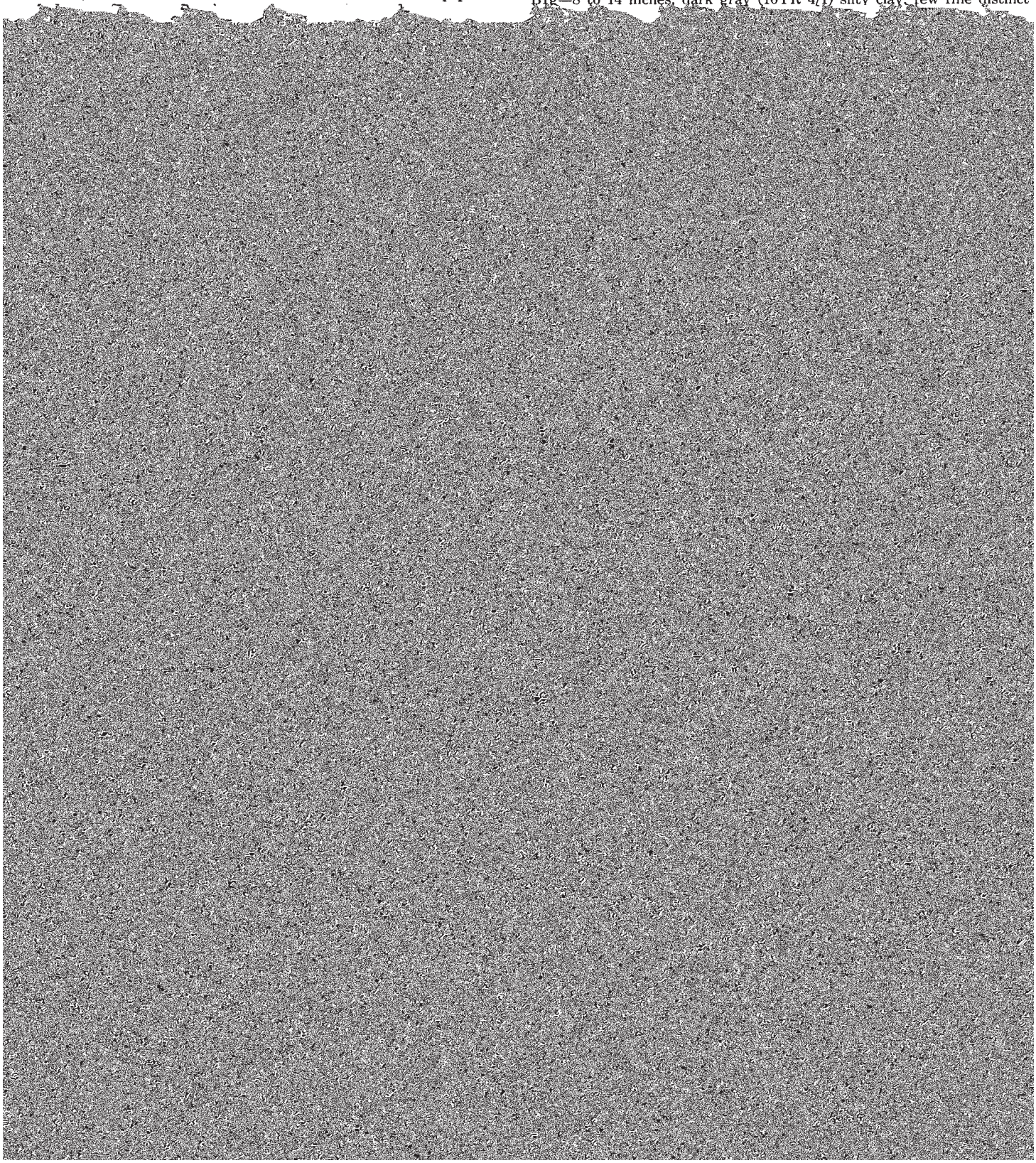
The Shoals series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in medium textured recent alluvium that washed mainly from soils formed in calcareous glacial till. Slope ranges from 0 to 2 percent.

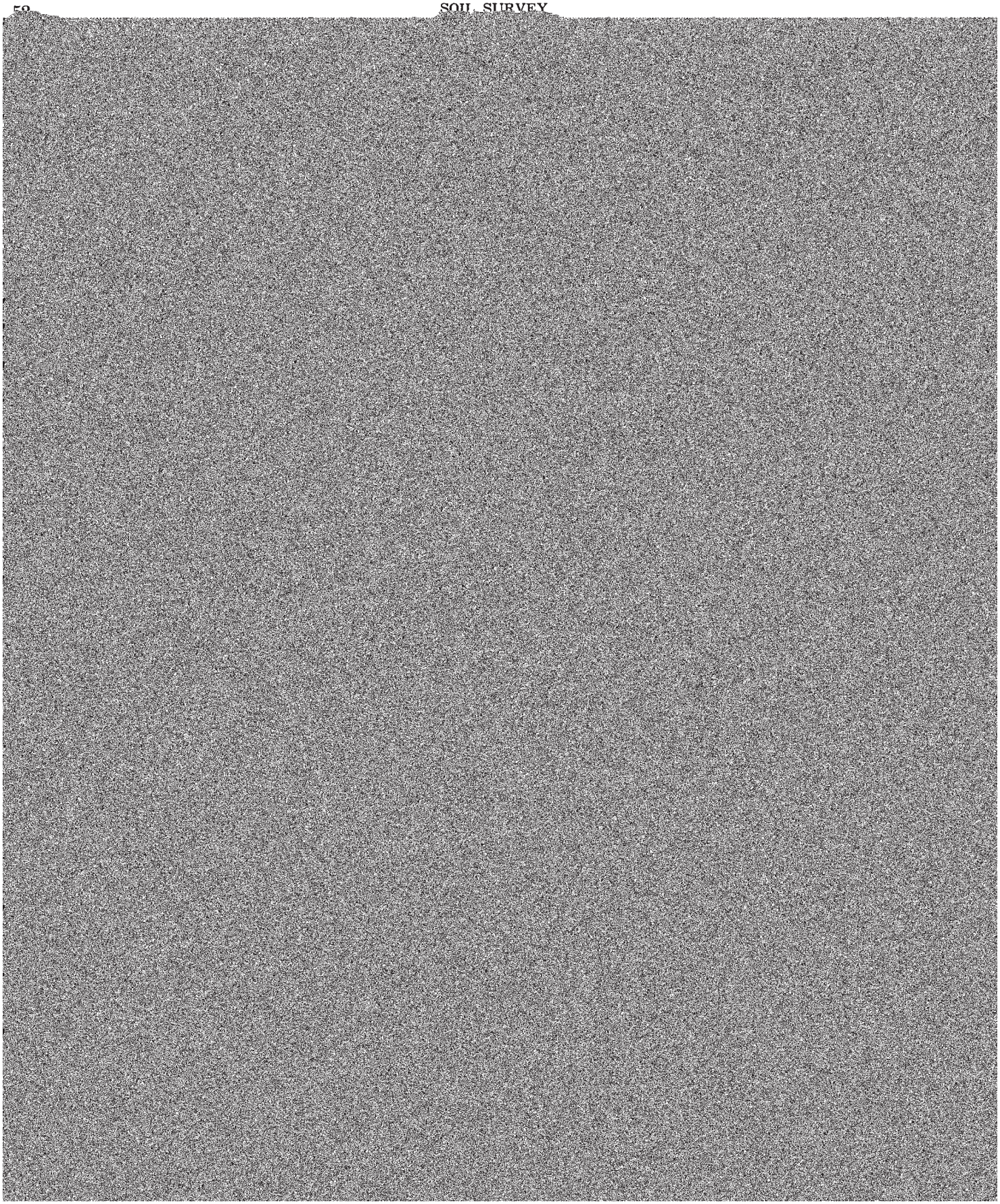
Shoals soils are commonly adjacent to Eel, Genesee, and Sloan soils and are similar to Defiance soils. Eel and Genesee soils do not have a subhorizon with dominant chroma of 2 or less between the Ap horizon and a depth of 20 inches. Sloan soils have a mollic epipedon and have a

Sloan soils are commonly adjacent to Eel, Genesee, and Shoals soils and are similar to Wabasha soils. Eel, Genesee, and Shoals soils do not have a mollic epipedon

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay; weak medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

B1g—8 to 14 inches; dark gray (10YR 4/1) silty clay; few fine distinct





	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Coprogenous. Designating the influence of animal excrement, as of the earthworm, in forming soil, especially humus.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Delta. An alluvial deposit, commonly triangular in shape, formed largely beneath water and deposited at the mouth of a river or stream.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpoots" and "climatic

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and sub-

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical,

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are con-

to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic [illegible]

deposited by the sea.

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

Thin layer. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

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

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that [illegible]

Illustrations

Figure 1.—Corn on Blount silt loam, 0 to 2 percent slopes.

Figure 2.—Wooded area of Blount silt loam, 2 to 6 percent slopes. Trees are mixed oak, predominantly white oak and red oak.

Figure 3.—Pond constructed in a drainageway in Blount silt loam, 2 to 6 percent slopes. The pond helps to control storm water runoff and reduces the hazard of downstream erosion.

Figure 4.—Muskmelons on Genesee silt loam. This soil is well suited to specialty crops.

Figure 5.—Potatoes in a drained area of Montgomery silty clay.

Figure 6.—Soybeans on Pewamo silty clay loam. The light colored Blount soils are in the background.

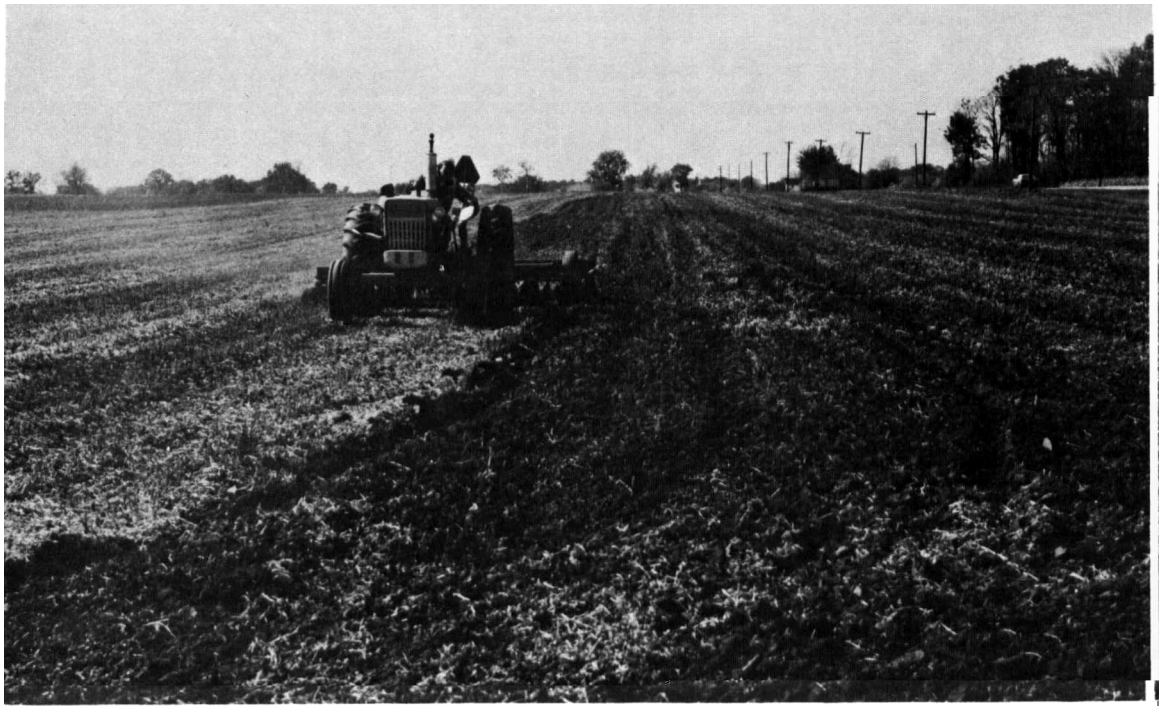


Figure 7.—Preparing a seedbed for wheat by disking soybean residue on Pewamo silty clay loam. Returning crop residue to the soil improves tilth and maintains organic-matter content.

Figure 8.—Grassed waterway on Pewamo and Blount soils. Grassed waterways help to control erosion and runoff.

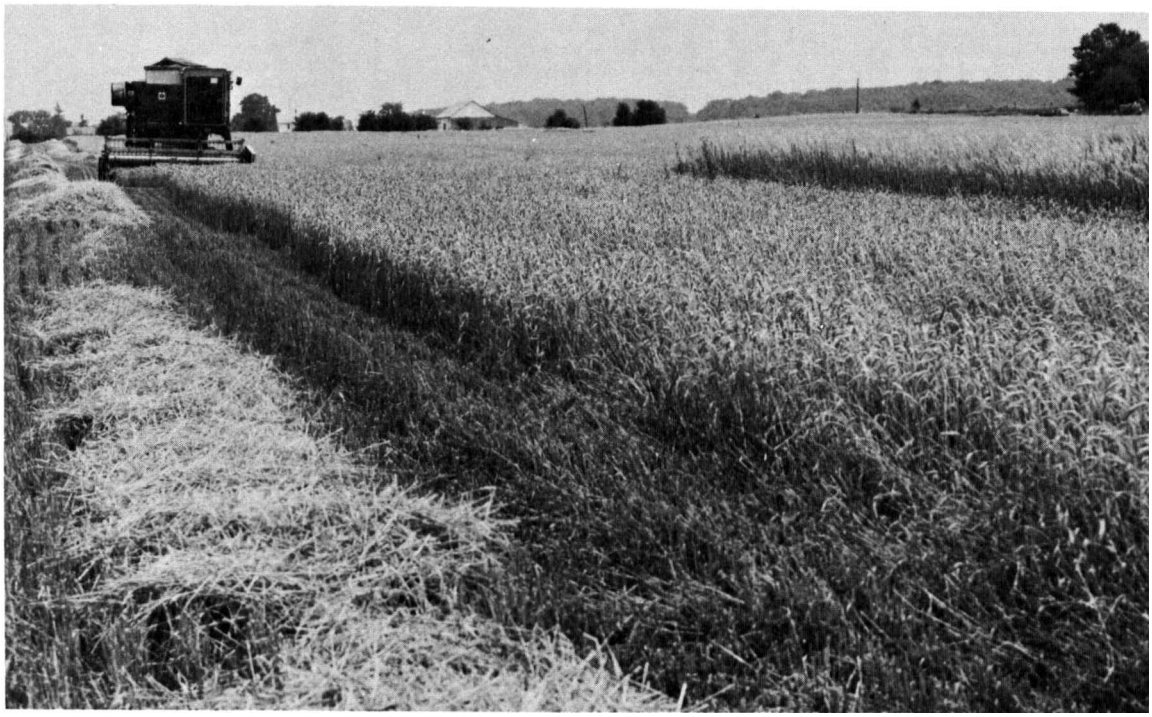
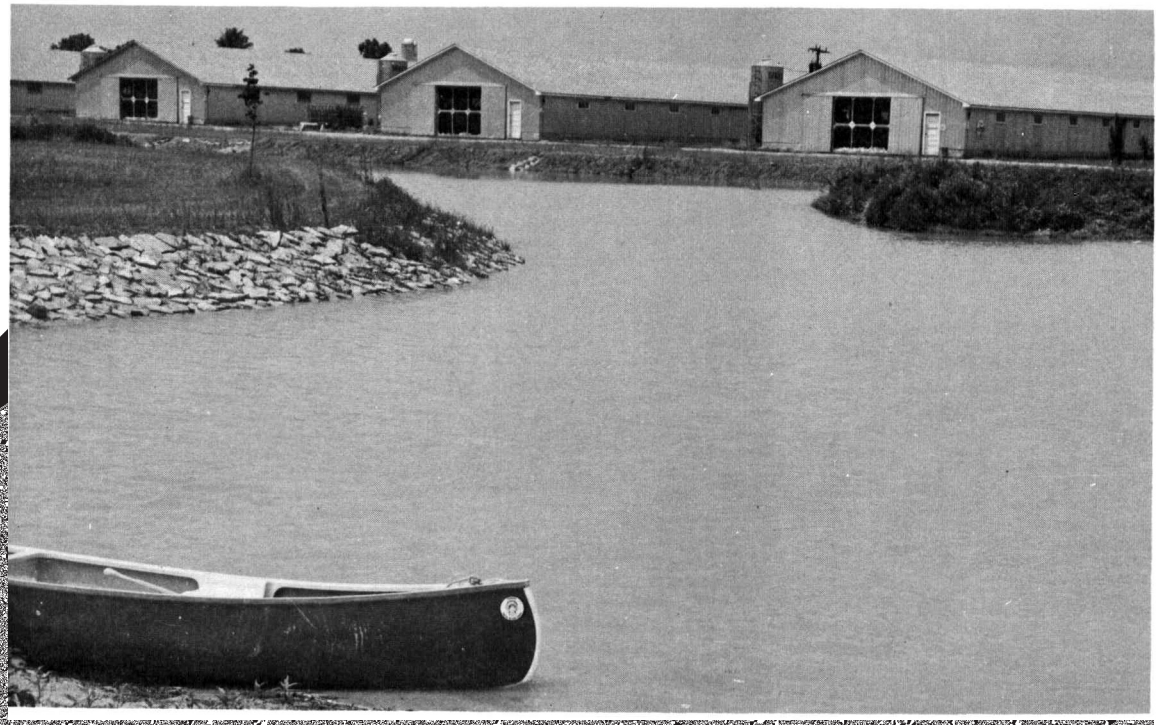


Figure 9.—Harvesting wheat on Pewamo silty clay loam and Blount silt loam, 0 to 2 percent slopes. Wheat is one of the small grains commonly grown in the county.



Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[2]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	33.6	17.3	25.5	58	-13	10	2.21	1.15	3.06	6	7.8
February---	36.6	19.7	28.2	61	-8	0	1.92	1.00	2.67	5	7.5
March------	47.2	28.5	37.8	77	4	122	2.97	1.54	4.13	7	7.3
April------	61.7	39.5	50.7	83	19	321	4.09	2.15	5.67	8	1.4

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 18	April 29	May 19
2 years in 10 later than--	April 13	April 24	May 13
5 years in 10 later than--	April 4	April 15	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	October 19	October 10	September 28
2 years in 10 earlier than--	October 25	October 16	October 3
5 years in 10 earlier than--	November 7	October 26	October 13

[1]Recorded in the period 1957-75 at Celina, Ohio.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	193	171	138
8 years in 10	201	179	147
5 years in 10	216	193	164
2 years in 10	231	207	181
1 year in 10	239	215	190

[1]Recorded in the period 1957-75 at Celina, Ohio.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BoA	Blount silt loam, 0 to 2 percent slopes	37,272	13.1
BoB	Blount silt loam, 2 to 6 percent slopes	90,009	31.7
Ca	Carlisle muck	78	(*)
Df	Defiance silty clay	3,042	1.1
DmA	Digby loam, 0 to 2 percent slopes	653	0.2
DmB	Digby loam, 2 to 6 percent slopes	356	0.1
Ed	Edwards muck	158	0.1
Ee	Eel silt loam	1,598	0.6
ElB	Eldean loam, 2 to 6 percent slopes	169	0.1
ElC2	Eldean loam, 6 to 12 percent slopes, moderately eroded	134	(*)
EoB	Elliott silt loam, 1 to 4 percent slopes	2,954	1.0
GaB	Gallman sandy loam, 2 to 6 percent slopes	326	0.1
GbB	Gallman loam, 2 to 6 percent slopes	409	0.1
Gn	Genesee silt loam	1,816	0.6
GwB	Glynwood silt loam, 2 to 6 percent slopes	19,474	6.9
GwB2	Glynwood silt loam, 2 to 6 percent slopes, moderately eroded	6,450	2.3
GwC2	Glynwood silt loam, 6 to 12 percent slopes, moderately eroded	7,203	2.5
HnA	Haskins loam, 0 to 2 percent slopes	748	0.3
HnB	Haskins loam, 2 to 6 percent slopes	765	0.3
McA	McGary silty clay loam, 0 to 2 percent slopes	2,294	0.8
McB	McGary silty clay loam, 2 to 6 percent slopes	1,483	0.5
Mg	Millgrove silty clay loam	1,874	0.7
Mh	Millsdale silty clay loam	122	(*)
Mn	Montgomery silty clay	15,939	5.6
MrD2	Morley silt loam, 12 to 18 percent slopes, moderately eroded	485	0.2
MrE2	Morley silt loam, 18 to 25 percent slopes, moderately eroded	446	0.2
MsD3	Morley clay loam, 9 to 18 percent slopes, severely eroded	522	0.2
OcA	Ockley loam, 0 to 2 percent slopes	107	(*)
OcB	Ockley loam, 2 to 6 percent slopes	630	0.2
On	Olentangy mucky silt loam	69	(*)
Pm	Pewamo silty clay loam	75,303	26.5
Pn	Pewamo silty clay loam, ponded	455	0.2
Po	Pewamo silty clay	426	0.1
Ps	Pits, gravel	120	(*)
Qu	Quarries	192	0.1
RmB	Rawson loam, 2 to 6 percent slopes	755	0.3
Sh	Shoals silt loam	3,061	1.1
So	Sloan silty clay loam	3,739	1.3
Ud	Udorthents, loamy	230	0.1
Wh	Wabasha silty clay	1,552	0.5
		742	0.3

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1977. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay
	Bu	Bu	Bu	Bu	Ton
BoA---------- Blount	110	38	45	74	4.6
BoB---------- Blount	105	36	45	74	4.4
Ca---------- Carlisle	120	40	---	---	---
Df---------- Defiance	105	38	---	---	4.5
DmA---------- Digby	115	38	48	76	4.6

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay
	Bu	Bu	Bu	Bu	Ton
Mh---------- Millsdale	100	40	45	---	4.0
Mn---------- Montgomery	115	40	40	75	4.5
MrD2---------- Morley	72	---	30	48	3.0
MrE2---------- Morley	---	---	---	---	2.0
MsD3---------- Morley	68	---	26	44	2.6

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	107	---	---	---
II	238,598	115,847	122,751	---
III	42,105	15,270	26,835	---
IV	643	485	158	---
V	455	---	455	---
VI	968	968	---	---
VII	---	---	---	---
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
BoA, BoB---------- Blount	3o	Slight	Slight	Slight	Slight	White oak----------	65	Eastern white pine, Scotch pine, eastern redcedar, red pine, yellow-poplar.
						Northern red oak----	65	
						Green ash----------	---	
						Bur oak----------	---	
						Pin oak----------	---	
Ca---------- Carlisle	4w	Slight	Severe	Severe	Severe	Red maple----------	46	Northern white-cedar, Austrian pine, eastern white pine.
						White ash----------	---	
						Green ash----------	---	
						Black cherry--------	---	
						Swamp white oak-----	---	
						Silver maple--------	---	
Df---------- Defiance	3c	Slight	Moderate	Severe	Slight	Northern red oak----	70	Eastern white pine, yellow-poplar.
						Pin oak----------	80	
DmA, DmB---------- Digby	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	White ash, red maple, eastern white pine, yellow-poplar.
						White oak----------	75	
						White ash----------	---	
						Pin oak----------	---	
Ed---------- Edwards	4w	Slight	Severe	Severe	Severe	Red maple----------	46	Austrian pine, Scotch pine, eastern white pine, northern white-cedar.
						White ash----------	---	
						Green ash----------	---	
						Black cherry--------	---	
						Swamp white oak-----	---	
						Silver maple--------	---	
Ee---------- Eel	1o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Eastern white pine, black walnut, yellow-poplar, black locust.
						Eastern cottonwood--	---	
						White ash----------	---	
						Black walnut--------	---	
ElB, ElC2---------- Eldean	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, black walnut, yellow-poplar.
						Black oak----------	80	
						White oak----------	80	
EoB---------- Elliott	2o	Slight	Slight	Slight	Slight	White oak----------	---	White oak, black walnut, northern red oak, green ash, sugar maple, eastern white pine.
						Northern red oak----		
						Pin oak----------		
						Bur oak----------		
GaB, GbB---------- Gallman	1o	Slight	Slight	Slight	Slight	Northern red oak----	90	Eastern white pine, yellow-poplar, black walnut, white ash, Norway spruce.
						White oak----------	85	
						White ash----------	---	
						Black walnut--------	---	
Gn---------- Genesee	1o	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	Eastern white pine, black walnut, yellow-poplar, black locust.
GwB, GwB2, GwC2---- Glynwood	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar.
						Black oak----------	80	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
McA, McB---------- McGary	3w	Slight	Moderate	Moderate	Slight	White oak----------	70	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar,
						Pin oak----------	85	
						Yellow-poplar-------	85	

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
RmB---------- Rawson	2o	Slight	Slight	Slight	Slight	White oak----------	75	Eastern white pine, yellow-poplar, black walnut.
						Northern red oak----	80	
Sh---------- Shoals	2o	Slight	Slight	Slight	Slight	Pin oak----------	90	Sweetgum, red maple, swamp chestnut oak, pin oak, yellow poplar.
						Yellow-poplar-------	90	
						Eastern cottonwood--	---	
						White ash----------	---	
So---------- Sloan	2w	Slight	Severe	Severe	Severe	Pin oak----------	85	Norway spruce, red maple, white ash.
						Swamp white oak-----	---	
						Red maple----------	---	
Wh---------- Wabasha	3w	Slight	Severe	Severe	Severe	Pin oak----------	80	Eastern cottonwood, red maple, white ash.
						Northern red oak----	70	
						Red maple----------	---	

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BoA, BoB---------- Blount	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: frost action, low strength.	Severe: wetness.
Ca---------- Carlisle	Severe: floods, wetness, excess humus.	Severe: wetness, low strength, floods.	Severe: wetness, low strength, floods.	Severe: wetness, low strength, floods.	Severe: low strength, wetness, floods.	Severe: excess humus, wetness, floods.
Df---------- Defiance	Severe: floods, wetness.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, low strength, wetness.	Severe: floods, too clayey, wetness.
DmA, DmB---------- Digby	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
Ed---------- Edwards	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: excess humus.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Mg---------- Millgrove	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action, low strength.	Severe: wetness.
Mh---------- Millsdale	Severe: wetness, depth to rock.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, depth to rock, shrink-swell.	Severe: wetness, shrink-swell, low strength.	Severe: low strength, wetness, frost action.	Severe: wetness.
Mn---------- Montgomery	Severe: wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, low strength, shrink-swell.	Severe: too clayey, wetness.
MrD2, MrE2-------- Morley	Severe: slope.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: slope, low strength.	Severe: low strength, slope.	Severe: slope.
MsD3---------- Morley	Moderate: too clayey, slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, shrink-swell, wetness.	Severe: slope.	Severe: low strength.	Moderate: too clayey, slope.
OcA---------- Ockley	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
OcB---------- Ockley	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.	Slight.
On---------- Olentangy	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
Pm---------- Pewamo	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: frost action, wetness, low strength.	Severe: wetness.
Pn---------- Pewamo	Severe: wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: frost action, floods, wetness.	Severe: floods, wetness.
Po---------- Pewamo	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: frost action, wetness, low strength.	Severe: wetness, too clayey.
Ps*. Pits, gravel						
Qu*. Quarries						
RmB---------- Rawson	Moderate: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.	Severe: low strength.	Slight.
Sh---------- Shoals	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.	Severe: wetness, floods.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
So---------- Sloan	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.	Severe: wetness, floods.
Ud*. Udorthents						
Wh---------- Wabasha	Severe: floods, wetness.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: floods, wetness, shrink-swell.	Severe: wetness, floods, low strength.	Severe: wetness, floods, too clayey.

* See map unit description for the composition and behavior of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BoA---------- Blount	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
BoB---------- Blount	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ca---------- Carlisle	Severe: floods, wetness.	Severe: wetness, excess humus, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness, excess humus.
Df---------- Defiance	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
DmA, DmB---------- Digby	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness, too sandy, seepage.
Ed---------- Edwards	Severe: floods, wetness, percs slowly.	Severe: floods, wetness, excess humus.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness, excess humus.
Ee---------- Eel	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
ElB---------- Eldean	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey.
ElC2---------- Eldean	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope, too clayey.
EoB---------- Elliott	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
GaB, GbB---------- Gallman	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Gn---------- Genesee	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
GwB, GwB2---------- Glynwood	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
GwC2---------- Glynwood	Severe: percs slowly, wetness.	Severe: slope.	Moderate: too clayey, wetness.	Moderate: slope, wetness.	Fair: slope, too clayey, wetness.
HnA---------- Haskins	Severe: percs slowly, wetness.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
HnB---------- Haskins	Severe: percs slowly, wetness.	Moderate: slope, seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
McA---------- McGary	Severe: wetness, percs slowly.	Slight----------	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness.
McB---------- McGary	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, wetness.
Mg---------- Millgrove	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Mh---------- Millsdale	Severe: wetness, percs slowly, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness	Severe: wetness.	Poor: wetness, too clayey.
Mn---------- Montgomery	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
MrD2---------- Morley	Severe: percs slowly, slope, wetness.	Severe: slope.	Moderate: slope, too clayey, wetness.	Severe: slope.	Poor: slope.
MrE2---------- Morley	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MsD3---------- Morley	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: too clayey, wetness.	Moderate: slope.	Fair: too clayey, slope.
OcA, OcB---------- Ockley	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
On---------- Olentangy	Severe: wetness, floods, percs slowly.	Severe: wetness, excess humus, floods.	Severe: wetness, excess humus, floods.	Severe: wetness, floods.	Poor: wetness, hard to pack.
Pm, Po---------- Pewamo	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: too clayey, wetness.
Pn---------- Pewamo	Severe: percs slowly, floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
Ps*. Pits, gravel					
Qu*. Quarries					
RmB---------- Rawson	Severe: percs slowly, wetness.	Moderate: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Sh---------- Shoals	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
So---------- Sloan	Severe: wetness, floods, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Ud*. Udorthents					
Wh---------- Wabasha	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness, too clayey.	Severe: floods, wetness.	Poor: wetness, too clayey.

* See map unit description for the composition and behavior of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BoA, BoB: Blount	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Ca: Carlisle	Poor: low strength, wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
Df: Defiance	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
DmA, DmB: Digby	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ed: Edwards	Poor: low strength, wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
Ee: Eel	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
ElB: Eldean	Good	Good	Good	Fair: small stones.
ElC2: Eldean	Good	Good	Good	Fair: small stones, slope.
EoB: Elliott	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
GaB, GbB: Gallman	Poor: low strength.	Fair: excess fines.	Poor: excess fines.	Fair: thin layer.
Gn: Genesee	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
GwB, GwB2: Glynwood	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
GwC2: Glynwood	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
HnA, HnB: Haskins	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
McA, McB: McGary	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, too clayey.
Mg: Millgrove	Poor: wetness, low strength.	Poor: excess fines.	Poor: excess fines.	Poor: wetness.
Mh: Millsdale	Poor: low strength, wetness, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Mn---------- Montgomery	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
MrD2---------- Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
MrE2---------- Morley	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
MsD3---------- Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
OcA, OcB---------- Ockley	Poor: low strength.	Good----------	Good----------	Fair: thin layer.
On---------- Olentangy	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, excess humus.
Pm, Pn---------- Pewamo	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Po---------- Pewamo	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.
Ps*. Pits, gravel				
Qu*. Quarries				
RmB---------- Rawson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Sh---------- Shoals	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
So---------- Sloan	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ud*. Udorthents				
Wh---------- Wabasha	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, too clayey.

* See map unit description for the composition and behavior of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
BoA---------- Blount	Favorable------	Wetness--------	Slow refill----	Percs slowly, frost action.	Not needed-----	Erodes easily, wetness, percs slowly.
BoB---------- Blount	Favorable------	Wetness--------	Deep to water, slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.
Ca---------- Carlisle	Seepage--------	Excess humus, wetness.	Slow refill----	Subsides, floods.	Not needed-----	Wetness.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Mg---------- Millgrove	Seepage--------	Seepage, wetness.	Slow refill----	Frost action---	Not needed-----	Wetness.
Mh---------- Millsdale	Depth to rock	Wetness, hard to pack, thin layer.	Slow refill----	Depth to rock, frost action.	Not needed-----	Wetness.
Mn---------- Montgomery	Favorable------	Wetness, hard to pack.	Slow refill----	Percs slowly---	Not needed-----	Wetness, erodes easily, percs slowly.
MrD2, MrE2, MsD3-- Morley	Slope----------	Favorable------	Deep to water, slow refill.	Not needed-----	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
OcA---------- Ockley	Seepage--------	Thin layer, seepage.	No water-------	Not needed-----	Not needed-----	Erodes easily.
OcB---------- Ockley	Seepage--------	Thin layer, seepage.	No water-------	Not needed-----	Favorable------	Erodes easily.
[illegible]	Favorable [illegible]	Wetness [illegible]	Slow refill [illegible]	Subsides [illegible]	Not needed-----	Wetness [illegible]

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BoA, BoB Blount	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ca Carlisle	Severe: floods, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.
Df Defiance	Severe: floods, wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, floods, too clayey.	Severe: too clayey.	Severe: floods, wetness, too clayey.
DmA, DmB Digby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: wetness.
Ed Edwards	Severe: floods, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.
Ee Eel	Severe: floods.	Slight	Moderate: floods.	Slight	Moderate: floods.
ElB Eldean	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
ElC2 Eldean	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Moderate: slope, small stones.
EoB Elliott	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
GaB Gallman	Slight	Slight	Moderate: slope.	Slight	Slight.
GbB Gallman	Slight	Slight	Moderate: slope.	Slight	Slight.
Gn Genesee	Severe: floods.	Slight	Moderate: floods.	Slight	Moderate: floods.
GwB, GwB2 Glynwood	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness, slope.	Slight	Slight.
GwC2 Glynwood	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight	Moderate: slope.
HnA, HnB Haskins	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Severe: wetness.
McA, McB McGary	Severe: percs slowly, wetness.	Moderate: wetness, too clayey.	Severe: wetness, percs slowly.	Moderate: too clayey, wetness.	Moderate: wetness, too clayey.
Mg Millgrove	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mh Millsdale	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mn---------- Montgomery	Severe: wetness, percs slowly, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey, percs slowly.	Severe: wetness, too clayey.	Severe: too clayey, wetness.
MrD2---------- Morley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MrE2---------- Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MsD3---------- Morley	Moderate: percs slowly, slope, too clayey.	Moderate: too clayey, slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
OcA---------- Ockley	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
OcB---------- Ockley	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
On---------- Olentangy	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pm---------- Pewamo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pn---------- Pewamo.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: floods, wetness.
Po---------- Pewamo	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Ps*. Pits, gravel					
Qu*. Quarries					
RmB---------- Rawson	Moderate: percs slowly.	Moderate: percs slowly, wetness.	Moderate: slope, percs slowly, wetness.	Slight----------	Slight.
Sh---------- Shoals	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
So---------- Sloan	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
Ud*. Udorthents					
Wh---------- Wabasha	Severe: wetness, floods, too clayey.	Severe: wetness, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, too clayey.	Severe: wetness, floods, too clayey.

* See map unit description for the composition and behavior of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BoA---------- Blount	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BoB---------- Blount	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ca---------- Carlisle	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Df---------- Defiance	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
DmA---------- Digby	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DmB---------- Digby	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ed---------- Edwards	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ee---------- Eel	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ElB---------- Eldean	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC2---------- Eldean	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EoB---------- Elliott	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
GaB, GbB---------- Gallman	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gn---------- Genesee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GwB, GwB2---------- Glynwood	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GwC2---------- Glynwood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HnA---------- Haskins	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
HnB---------- Haskins	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
McA---------- McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
McB---------- McGary	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mg---------- Millgrove	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Mh---------- Millsdale	Fair	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Mn---------- Montgomery	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain	Grasses	Wild herba-	Hardwood	Conif-	Wetland	Shallow	Openland	Woodland	Wetland

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BoA, BoB---------- Blount	0-7	Silt loam-------	ML, CL, CL-ML	A-6, A-4	0-5	95-100	95-100	90-100	80-95	25-40	3-15
	7-30	Silty clay loam, silty clay, clay.	CH, CL	A-7, A-6	0-5	95-100	90-100	90-100	80-95	35-60	15-35
	30-60	Silty clay loam, clay loam.	CL	A-6	0-10	90-100	90-100	80-100	70-90	25-40	10-25
Ca---------- Carlisle	0-63	Sapric material	Pt	A-8	---	---	---	---	---	---	---
Df---------- Defiance	0-20	Silty clay------	CL, CH	A-7	0	100	100	95-100	90-95	45-60	22-32
	20-47	Silty clay, clay, silty clay loam.	CH, MH	A-7	0	100	100	90-100	85-95	50-65	24-32
	47-60	Silty clay, clay	CH, MH	A-7	0	100	100	90-100	80-95	50-65	24-32
DmA, DmB---------- Digby	0-14	Loam----------	SM, ML	A-4	0	85-100	80-100	70-90	40-80	<36	NP-10
	14-44	Clay loam, sandy clay loam, gravelly loam.	CL, SC, CL-ML, SM-SC	A-6, A-4	0	85-100	70-100	55-75	40-70	25-40	4-15
	44-60	Stratified gravelly sandy loam to gravelly sand.	SM, SW-SM, SP-SM	A-4, A-2, A-1	0-5	80-100	65-90	40-65	10-40	<30	NP-4
Ed---------- Edwards	0-28	Sapric material	Pt	A-8	0	---	---	---	---	---	---
	28-60	Marl----------	---	---	0	100	95-100	80-90	60-80	---	---
Ee---------- Eel	0-8	Silt loam-------	ML, CL	A-4, A-6	0	100	100	90-100	75-85	26-40	3-15
	8-42	Silt loam, loam	ML, CL	A-4, A-6	0	100	100	90-100	75-85	26-40	3-15
	42-68	Stratified sandy loam to silty clay loam.	ML, CL	A-4, A-6	0	100	90-100	70-80	55-70	26-40	3-15
ElB, ElC2---------- Eldean	0-9	Loam----------	ML, CL-ML, CL	A-4, A-6	0	80-100	65-100	65-100	60-95	20-40	4-14
	9-31	Clay, sandy clay, gravelly clay.	CL	A-7, A-6	0-5	75-100	65-100	55-95	50-80	35-50	14-25
	31-37	Gravelly clay loam, gravelly loam, gravelly sandy loam.	CL, GC, SC	A-4, A-6, A-7	0-10	55-85	50-80	45-75	40-60	30-45	8-20
	37-70	Stratified sand to gravel.	GM, SM, GP-GM, SP-SM	A-1, A-2	0-15	25-70	20-50	10-40	5-35	---	NP
EoB---------- Elliott	0-14	Silt loam-------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	80-99	30-50	10-20
	14-30	Silty clay, clay, silty clay loam.	CH, CL	A-6, A-7	0-5	95-100	95-100	90-100	75-99	30-56	11-30
	30-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-95	28-45	11-24
GaB---------- Gallman	0-11	Sandy loam------	SM	A-4, A-2	0	75-100	70-100	55-75	30-50	<35	NP-6
	11-75	Sandy clay loam, gravelly clay loam, sandy loam.	SC, CL, ML	A-6, A-4, A-2	0	70-100	65-100	60-95	30-75	30-40	7-17
GbB---------- Gallman	0-11	Loam----------	ML, CL-ML	A-4	0	75-100	70-100	65-100	60-100	25-35	4-10
	11-75	Sandy clay loam, gravelly clay loam, sandy loam.	SC, CL, ML	A-6, A-4, A-2	0	70-100	65-100	60-95	30-75	30-40	7-17

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Gn---------- Genesee	0-10	Silt loam--------	ML, CL	A-4, A-6	0	100	100	90-100	75-85	26-40	3-15
	10-48	Silt loam, loam	ML, CL	A-4, A-6	0	100	100	90-100	75-85	26-40	3-15
	48-60	Stratified sandy loam to silt loam.	ML, CL	A-4, A-6	0	90-100	85-100	60-80	50-70	26-40	3-15
GwB, GwB2, GwC2---- Glynwood	0-9	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	55-90	23-40	2-10
	9-25	Clay, clay loam, silty clay loam.	CL, CH	A-7, A-6	0-5	95-100	90-100	85-100	80-95	35-55	15-30
	25-60	Clay loam, silty clay loam.	CL	A-6, A-4	0-5	95-100	85-100	80-95	65-85	25-40	7-18
HnA, HnB---------- Haskins	0-20	Loam----------	CL-ML, CL, SC, SM-SC	A-4, A-6	0	95-100	90-100	85-95	45-60	25-40	5-20
	20-36	Sandy clay loam, clay loam, gravelly sandy clay loam.	SC, CL	A-6, A-4	0	85-100	75-100	60-85	40-65	20-40	7-20

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OcA, OcB---------- Ockley	0-7	Loam----------	CL, ML, CL-ML	A-4, A-6	0	100	95-100	80-100	60-90	22-33	3-12
	7-27	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	75-100	65-90	50-90	35-50	15-30
	27-53	Gravelly clay loam, gravelly sandy clay loam.	CL, SC, GC	A-6, A-7	0-2	70-85	45-75	40-70	35-55	30-50	15-30
	53-72	Stratified sand to gravelly sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	20-55	5-20	2-10	---	NP
On---------- Olentangy	0-40	Mucky silt loam, coprogenous earth.	OL	A-8	0	---	---	---	---	---	---
	40-60	Silt loam, silty clay loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	70-95	20-40	3-15
Pm, Pn----------	0-13	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	80-100	70-90	25-40	10-20

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Wind erodibility group is for the surface layer. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group
						K	T	
	In	In/hr	In/in	pH				
BoA, BoB--------- Blount	0-7	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.43	3	6
	7-30	0.06-0.6	0.10-0.17	4.5-8.4	Moderate------	0.43		
	30-60	0.06-0.6	0.07-0.14	7.4-8.4	Moderate------	0.43		
Ca---------- Carlisle	0-63	0.2-6.0	0.35-0.45	4.5-7.8	----------	---	---	3
Df---------- Defiance	0-20	0.2-0.6	0.12-0.14	6.1-7.8	High----------	0.32	5	4
	20-47	<0.2	0.12-0.16	6.1-7.8	High----------	0.32		
	47-60	<0.2	0.12-0.16	6.6-7.8	High----------	0.32		
DmA, DmB--------- Digby	0-14	0.6-2.0	0.13-0.16	5.6-7.3	Low----------	0.32	4	5
	14-44	0.6-2.0	0.12-0.16	4.5-7.8	Low----------	0.32		
	44-60	6.0-20	0.02-0.06	7.4-8.4	Low----------	0.10		
Ed---------- Edwards	0-28	0.2-6.0	0.35-0.45	5.6-7.8	----------	---	---	3
	28-60	---	---	7.4-8.4	----------	---		
Ee---------- Eel	0-8	0.6-2.0	0.20-0.24	6.1-7.8	Low----------	0.32	5	5
	8-42	0.6-2.0	0.17-0.22	6.1-8.4	Low----------	0.32		
	42-68	0.6-2.0	0.19-0.21	7.4-8.4	Low----------	0.32		
ElB, ElC2-------- Eldean	0-9	0.6-2.0	0.18-0.22	5.6-7.3	Low----------	0.37	4	5
	9-31	0.2-2.0	0.13-0.16	5.6-7.8	Moderate------	0.37		
	31-37	0.6-2.0	0.07-0.14	6.6-8.4	Low----------	0.37		
	37-70	>6.0	0.01-0.04	6.6-8.4	Low----------	0.10		
EoB---------- Elliott	0-14	0.6-2.0	0.21-0.24	5.6-7.3	Moderate------	0.32	5	6
	14-30	0.2-0.6	0.11-0.20	5.6-7.8	Moderate------	0.32		
	30-60	0.2-0.6	0.14-0.20	7.4-8.4	Moderate------	0.32		
GaB---------- Gallman	0-11	2.0-6.0	0.10-0.14	5.6-7.3	Low----------	0.32	5	3
	11-75	2.0-6.0	0.10-0.16	4.5-7.8	Low----------	0.32		
GbB---------- Gallman	0-11	2.0-6.0	0.14-0.18	5.6-7.3	Low----------	0.32	5	5
	11-75	2.0-6.0	0.10-0.16	4.5-7.8	Low----------	0.32		
Gn---------- Genesee	0-10	0.6-2.0	0.20-0.24	6.1-7.3	Low----------	0.32	5	5
	10-48	0.6-2.0	0.17-0.22	6.1-7.8	Low----------	0.32		
	48-60	0.6-2.0	0.19-0.21	7.4-8.4	Low----------	0.32		

ms as "rare,"

Risk of corrosion	
Uncoated steel	Concrete
High-----	High.
High-----	Low.
High-----	Low.
Moderate	High.
High-----	Low.
Moderate	Low.
High-----	Moderate.
High-----	Moderate.
Moderate	Moderate.
Low------	Low.
High-----	Moderate.
High-----	Moderate.
High-----	Low.
High-----	Low.
High-----	Low.
High-----	Low.
High-----	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
OcA, OcB---------- Ockley	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
On---------- Olentangy	A/D	Common------	Brief-----	Oct-Jul	0-1.0	Apparent	Oct-Jul	>60	---	High-----	High-----	High.
Pm, Po---------- Pewamo	B/D	None--------	---	---	0-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
Pn---------- Pewamo	D	Frequent----	Brief-----	Mar-Apr	0-1.5	Apparent	Oct-Jun	>60	---	High-----	High-----	Low.
Ps*. Pits, gravel												
Qu*. Quarries												
RmB---------- Rawson	B	None--------	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	Moderate	High-----	High.
Sh---------- Shoals	C	Common------	Brief-----	Oct-Jun	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	Low.
So---------- Sloan	B/D	Frequent----	Brief-----	Nov-Jun	0-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
Ud*. Udorthents												
Wh---------- Wabasha	D	Frequent----	Brief to long.	Jan-May	0-0.5	Apparent	Dec-Jun	>60	---	Moderate	High-----	Low.

* See map unit description for the composition and behavior of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Blount	Fine, illitic, mesic Aeric Ochraqualfs
Carlisle	Euic, mesic Typic Medisaprists
Defiance	Fine, illitic, nonacid, mesic Aeric Fluvaquents
Digby	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Edwards	Marly, euic, mesic Limnic Medisaprists
Eel	Fine-loamy, mixed, nonacid, mesic Aquic Udifluvents
Eldean	Fine, mixed, mesic Typic Hapludalfs
Elliott	Fine, illitic, mesic Aquic Argiudolls
Gallman	Fine-loamy, mixed, mesic Typic Hapludalfs
*Genesee	Fine-loamy, mixed, nonacid, mesic Typic Udifluvents
Glynwood	Fine, illitic, mesic Aquic Hapludalfs
Haskins	Fine-loamy, mixed, mesic Aeric Ochraqualfs
McGary	Fine, mixed, mesic Aeric Ochraqualfs
Millgrove	Fine-loamy, mixed, mesic Typic Argiaquolls
Millsdale	Fine, mixed, mesic Typic Argiaquolls

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.