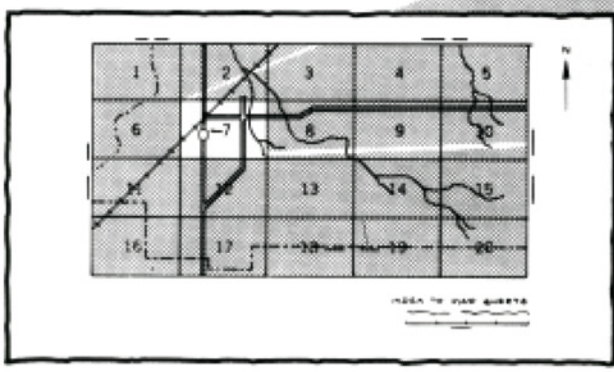
SOIL SURVEY OF

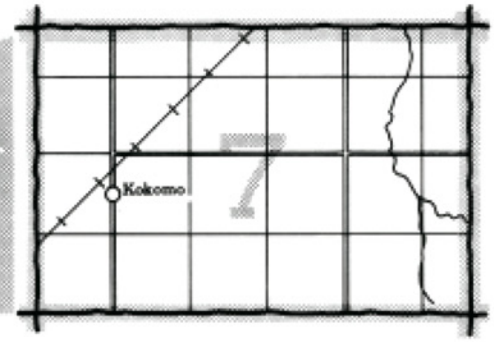
Kane County, Illinois

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

HOW TO USE

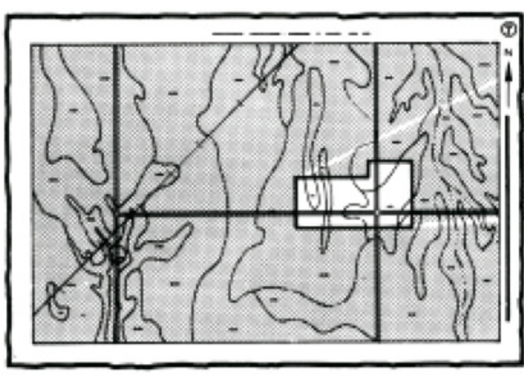
1. Locate your area of interest on the "Index to Map Sheets"

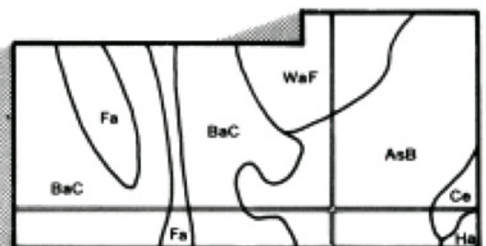




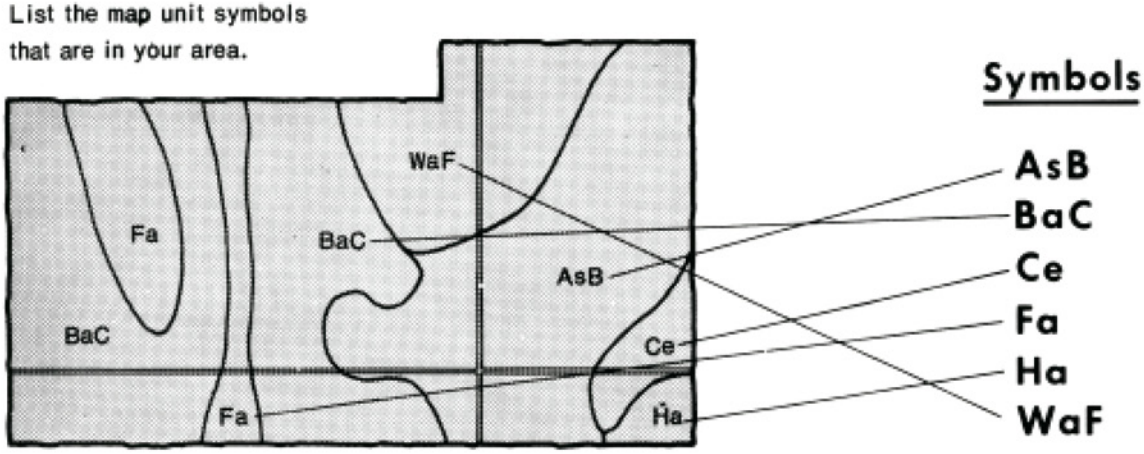
2. Note the number of the map sheet and turn to that sheet.

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



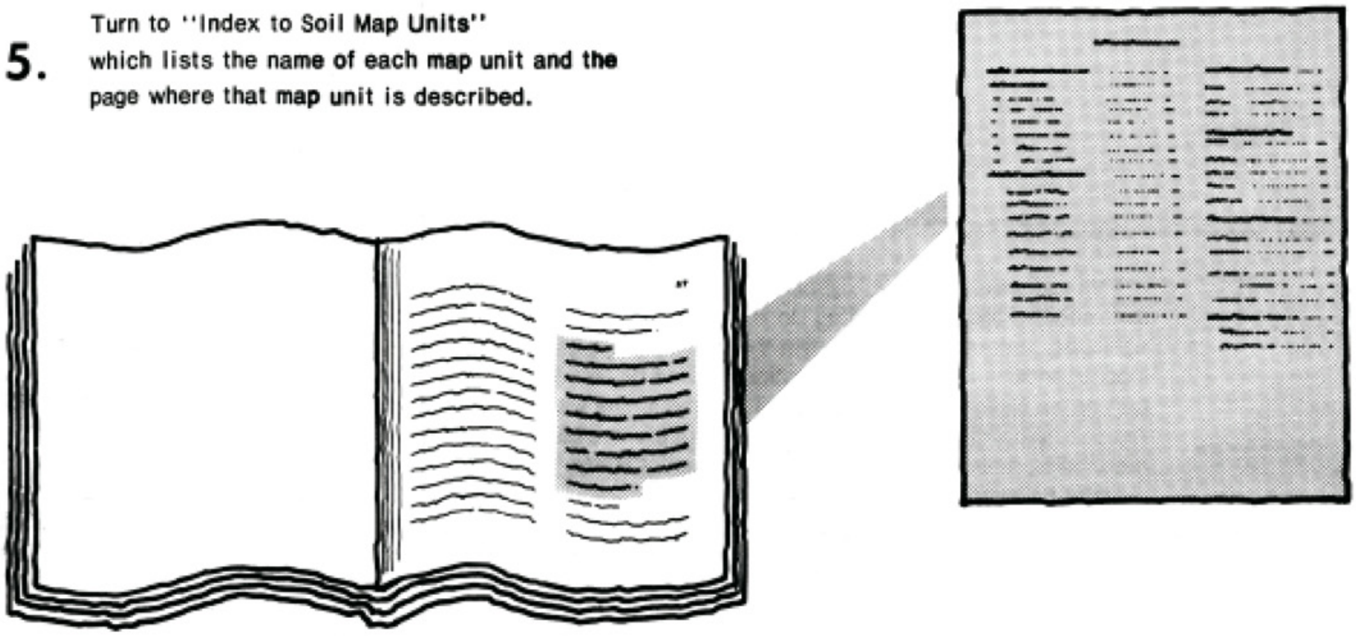


4. List the map unit symbols that are in your area.

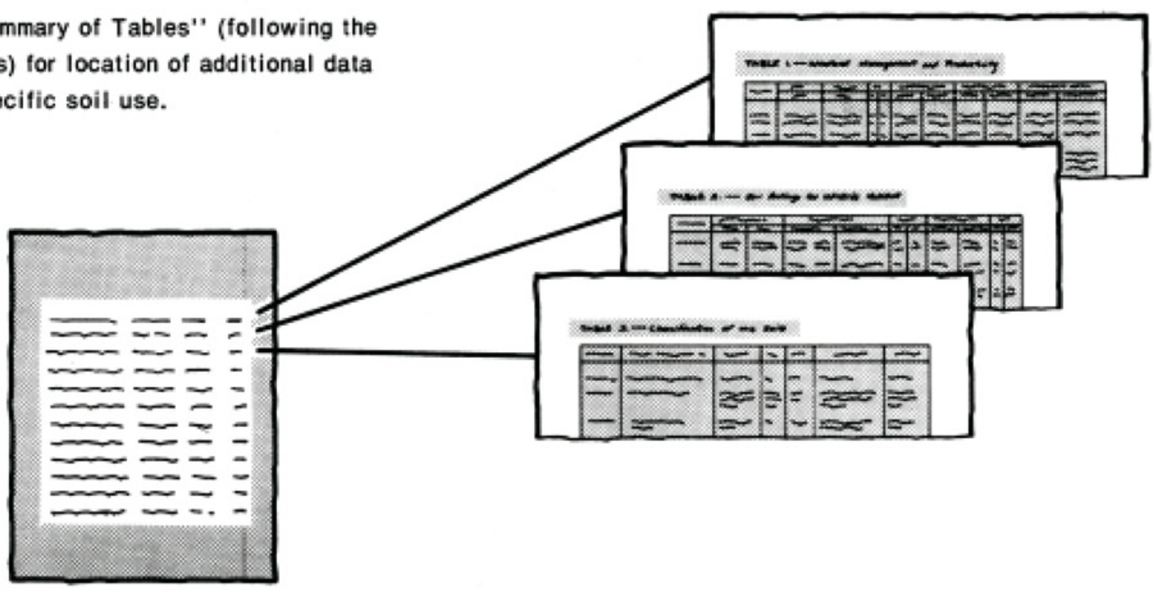


THIS SOIL SURVEY

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.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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 1966-75. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Kane-Du Page Soil and Water Conservation District. The cost was shared by the Kane County Board of Supervisors.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

This survey is Illinois Agriculture Experiment Station Soil Report No. 109.

Cover: Urban land frequently encroaches on farmland in the county. The Proctor soils in the foreground are well suited to farming and only moderately well suited to dwellings.

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Summary of Tables

Foreword

This soil survey contains much information useful in land-planning programs in Kane County. 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 selected land uses will have on the environment.

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

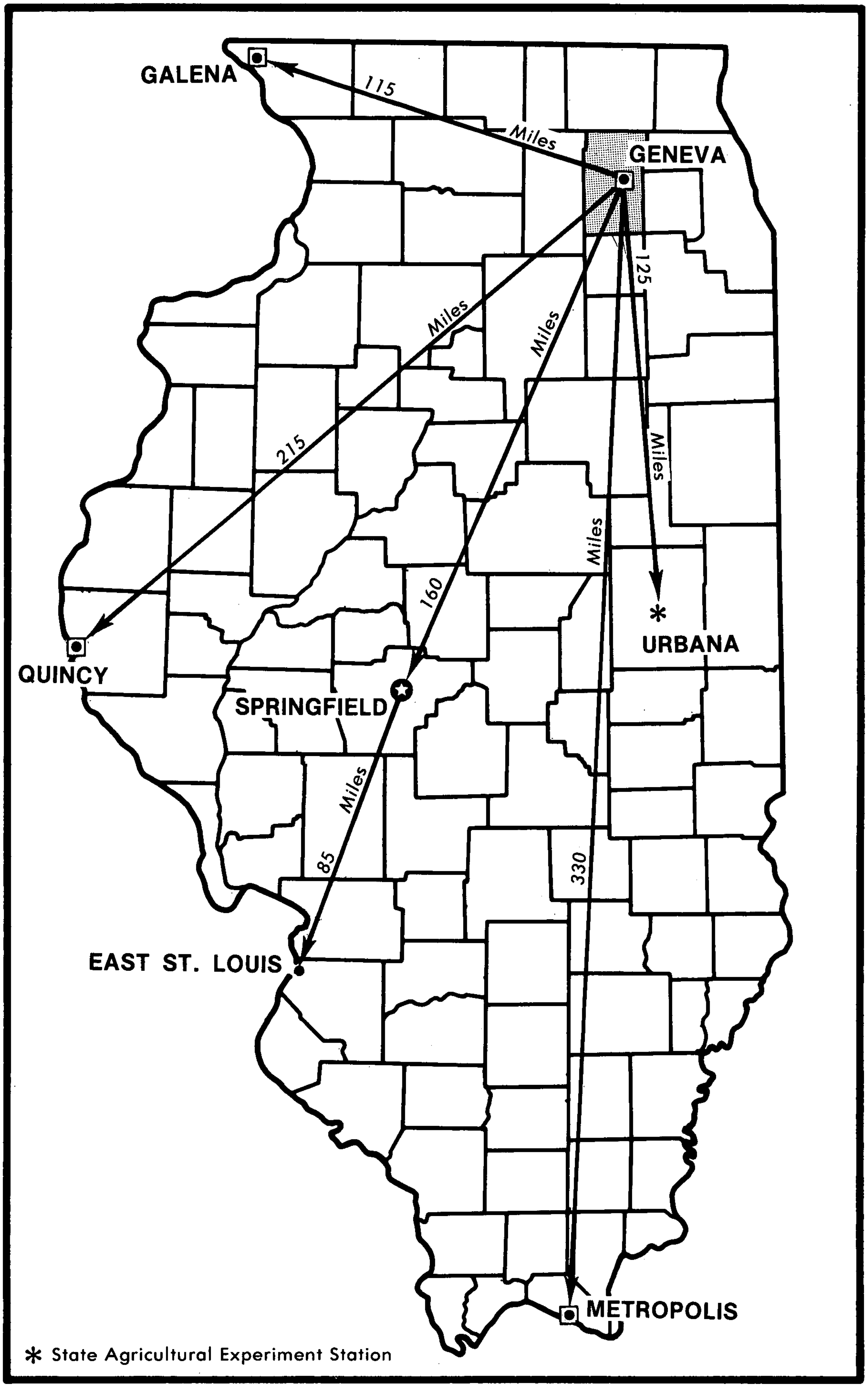
Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption 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. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Daniel E. Holmes

Daniel E. Holmes
State Conservationist
Soil Conservation Service



Location of Kane County in Illinois.

SOIL SURVEY OF KANE COUNTY, ILLINOIS

By Tyrone M. Goddard, Soil Conservation Service

Fieldwork by Tyrone M. Goddard, K. C. Hinkley, James R. Martin, Christopher Cochran, Robert T. Hendrickson, Soil Conservation Service

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

KANE COUNTY is in the extreme northeastern part of Illinois as shown on the map on the facing page. It has a total area of 332,800 acres, or 520 square miles. In 1970 the population was 251,000. Aurora, the most populous city, is in the southeastern part of the county. It has a population of 79,600.

The urban centers of the county are mainly along the Fox River in the eastern part of the county. Most of the county is influenced by urban development, however, and competition between urban and agricultural land uses is an important issue. Nearly one-third of the county was in urban development in 1970.

About 254,000 acres was used for agriculture in 1974. The principal crops grown are corn, soybeans, oats, and wheat. Grasses and legumes are also grown, and many farms have livestock. Commercial woodland production in the county is minimal.

General nature of the county

This section contains information of a general nature concerning the county. It includes sections on natural resources, relief, settlement, farming, and climate.

Natural resources

Sand and gravel deposits in various places throughout the county and limestone quarries along the Fox River and in Big Rock Township provide building materials needed for construction. Peat and muck in Nelson Lake and in areas to the north in Rutland Township are also excavated for commercial use. Oak and hickory groves, once abundant in the Fox River Valley, are now mostly in county forest preserves, which provide areas for recreation.

Water for the county is supplied by surficial drainage into the Kishwaukee and Fox river watersheds, as well as water supplies in shallow and deep aquifers (*7, 10*). Shallow aquifers include both Wisconsin age glacial deposited sand and gravel aquifers and the Silurian dolomite aquifers. These aquifers are recharged from local precipitation and surface stream inflow. Deep aquifers, running northwest-southeast on a slope of 0.2 percent, are in Cambrian-Ordovician sandstone and Mt. Simon sandstone. Recharge areas for these aquifers are in De Kalb, McHenry, Boone, and northwest Kane Counties.

Relief and drainage

Elevation in Kane County ranges from about 630 feet above sea level in the city of Montgomery near the southeastern corner of the county to 1,065 feet above sea level in Plato Township on Tower Road. Johnson's Mound in the central part of the county has an elevation of 898 feet.

More than 90 percent of the soils in the county are on uplands that consist of glacial till and outwash areas. They are discussed in more detail in the section "Geology of the County."

The major bottom-land areas are along Big Rock, Blackberry, Ferson, Mill, Tyler, and Welch Creeks and the Fox River.

About 60 percent of the county is in the Fox River watershed. The major streams flow south and east into the Fox River. The northwestern part of the county drains north and west into the Kishwaukee River.

The principal sources of water are wells drilled 700 to 2,300 feet deep into the Cambrian-Ordovician sandstone aquifer system and 100 to 150 feet deep into the Silurian dolomite aquifer system. Water from these sources supplies dwellings and industry in cities along the Fox River. Shallow wells, less than 150 feet deep in sand and gravel aquifers, generally supply water for small towns and farmsteads in the western part of the county. In many areas, water is stored in ponds and used for livestock.

Settlement of the county

The original inhabitants of Kane County were Pottawatomie Indians. They had settlements near the Fox River in Aurora and Dundee and south of Batavia. Two Indian chiefs whose names have become well known were

Waubonsee and Shabbona. These chiefs and their people were friendly to the early settlers.

When the first settlers came to the county in 1833, they found abundant hardwood forest adjacent to the Fox River, which dissects the eastern part of the county, and lush prairie grasses in the western part of the county (*6*). The early settlers made their homes near the Fox River. Christopher Payne, the first settler, lived east of the present city of Batavia. A trading store was located along Mill Creek, near Mooseheart, and trading was carried on with the Indians as well as with other settlers. St. Charles became the first incorporated town in 1839. The first school was located in Montgomery.

Settlement increased in the county when the Blackhawk War with the Indians in northern Illinois came to an end. This war has been named for Blackhawk, chief of the Fox and Sac nations. Chiefs Shabbona and Waubonsee sided with the settlers during the war.

In 1840, the population of the county was 6,500. It increased to 16,700 people by 1850 and to 30,000 by 1860. Most of these people were farmers, but the urban centers along the Fox River were established.

The population in 1900 was 70,000; by 1950 it had nearly doubled to 150,000; and by 1970 it was 251,000. Most of the towns in the county have industries, but many residents commute to Chicago and nearby towns for work (*8*).

Farming

Most of the Indians who inhabited Kane County when the settlers came obtained their food by hunting and fishing; however, farming was an important source of food for a small Indian settlement in northeastern Kane County.

Many of the early settlers who migrated from New York and Pennsylvania in the 1830's found the timber land more attractive for cultivation than the prairies. They began clearing trees and planting crops. The prairie land was not easily cultivated with horse and plow. The prairie grasses had a dense rooting system and they often grew to 10 or 15 feet in height and covered large areas.

By 1870, however, most of the land in the county was farmed. There were about 240,000 acres of improved land, 35,000 acres of woodland, and the rest was unimproved acreage. The main crops were oats, Indian corn, and spring wheat.

Drainage districts were organized in the county during the period 1900 to 1920. This made possible the cultivation of more land and improved the yield of some of the land already under cultivation.

Erosion control became an important issue among farmers in the county in the late 1930's. An outgrowth of this concern was the formation of the Kane County Soil and Water Conservation District in 1944. The district was later expanded to include Du Page County.

Acreage in farmland began to decline during the 1950's, as a result of urban expansion. By 1974, there were 1,018 farms in Kane County with a total of 253,926 acres. About 106,218 acres were used for corn, 69,358 acres for soybeans, 10,971 acres for oats, and 3,093 acres for wheat. About 9,312 acres were in pasture, and 15,614 acres were in hayland. There were 589 farms with dairy or beef herds.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Aurora for the period 1951 to 1973. 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 24 degrees F, and the average daily minimum temperature is 16 degrees. The lowest temperature on record, which occurred at Aurora on February 2, 1951, is minus 25 degrees. In summer the average temperature is 71 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred on July 10, 1966, is 100 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, 34.7 inches, or 63 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 18 inches. The heaviest 1-day rainfall during the period of record was 10.48 inches at Aurora on October 10, 1954. Thunderstorms occur on about 38 days each year.

Average seasonal snowfall is 32 inches. The greatest snow depth at any one time during the period of record was 31 inches. On the average, 24 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 75 percent. The percentage of possible sunshine is 70 in summer and 45 in winter. The prevailing wind is from the west. Average windspeed is highest, 12 miles per hour, in March.

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

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 knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

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

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

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 part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The map units in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included map units are described in the following pages.

Nearly level to moderately steep soils that are moderately permeable in the subsoil and moderately to very rapidly permeable in the underlying material; on outwash plains, kamic ridges, and eskers

This group consists of four map units that make up about 19 percent of the county. The soils are used to grow corn, soybeans, wheat, oats, hay, and pasture and some specialty crops. Subdivisions and small towns in these areas are attractive because of the rolling topography and scattered trees.

1. Will-Warsaw-Canisteo

Deep and moderately deep to sand and gravel, nearly level and gently sloping, poorly drained and well drained soils that formed in outwash material and have a loamy subsoil

This map unit is on the outwash plain. It consists of nearly level drainageways and depressions and broad, gently sloping ridges.

This map unit occupies about 2 percent of the county. Will soils make up about 30 percent of the unit, Warsaw soils make up about 20 percent, and Canisteo soils make up about 15 percent. The remaining 35 percent is minor soils (fig. 1).

The Will soils are in drainageways and on flats. They are lower on the landscape than Warsaw soils. Warsaw soils are on nearly level and gently sloping ridges above the Will and Canisteo soils. Canisteo soils are in closed depressions and drainageways adjacent to the Will soils.

The Will soils are poorly drained. They have a black silty clay loam surface layer. The subsoil is very dark gray and olive gray clay loam in the upper part and dark gray and grayish brown sandy loam in the lower part. Warsaw soils are well drained. They have a very dark gray and very dark grayish brown loam surface layer and a subsoil that is dark yellowish brown and brown to dark brown clay loam in the upper part and brown to dark brown sandy clay loam in the lower part. Canisteo soils are poorly drained. They have a black loam surface layer and a very dark gray and gray clay loam subsoil.

The minor soils in this map unit are the Kane, Lena, Houghton, and Lorenzo soils. The somewhat poorly drained Kane soils are on low lying ridges; the very poorly drained Houghton and Lena soils are in closed depressions; and the well drained Lorenzo soils are on nearly level to moderately sloping ridges and side slopes.

The soils in this map unit are used mainly for cultivated crops and pasture. They have good to fair potential for cultivated crops and pasture, fair potential for woodland, and good to poor potential for most urban uses.

The major limitation is wetness in poorly drained areas. When adequately drained, these soils are suitable for crops and some urban uses. When poorly drained soils are used for pasture, grasses should be selected that can withstand wetness.

2. Fox-Casco-Dresden

Shallow and moderately deep to sand and gravel, gently sloping to moderately steep, well drained soils that formed in outwash material and have a loamy subsoil

This map unit is on kamic ridges and eskers. Topography is knob and kettle type.

This map unit occupies about 4 percent of the county. Fox soils make up about 25 percent of the unit, Casco soils make up about 20 percent, and Dresden soils make up about 15 percent. The remaining 40 percent is minor soils.

The Fox soils are on gently to strongly sloping kamic ridges and side slopes. They are usually lower on the landscape than Casco soils but are slightly higher than the Dresden soils. The Casco soils are on strongly sloping and moderately steep kamic ridges and side slopes. Dresden soils are on gently sloping and moderately sloping kamic ridges adjacent to native prairie areas.

The Fox soils are moderately deep to sand and gravel. They have a dark grayish brown silt loam surface layer. The subsoil is dark yellowish brown and brown to dark brown silty clay loam in the upper part and brown to dark brown clay loam, sandy clay loam, and sandy loam in the lower part. The Casco soils are shallow to sand and gravel. They have a brown to dark brown loam surface layer and a subsoil that is brown to dark brown clay loam and sandy clay loam. The Dresden soils are moderately deep to sand and gravel. They have a very dark grayish brown silt loam surface layer and a subsoil that is brown to dark brown silty clay loam in the upper part and dark yellowish brown and brown to dark brown clay loam and sandy clay loam in the lower part.

The minor soils in this map unit are the Will, Kane, Rodman, and Houghton soils. The poorly drained Will soils are in drainageways; the somewhat poorly drained Kane soils are on low lying ridges; and the excessively drained Rodman soils are on moderately steep and steep side slopes. The very poorly drained Houghton soils are in closed depressions.

The soils in this map unit are used mainly for cultivated crops, pasture, and woodland. They have good to fair potential for cultivated crops, pasture, woodland, and urban development.

Some management practices that maintain fertility and tilth and control erosion are needed for cropland. Somewhat excessive slope and the rapid rate of water movement through the soil limit the suitability of the soils for urban development. These soils have few limitations for woodland and pasture. Moderately steep areas of pasture and woodland need erosion control.

3. Bowes-Dresden-Fox

Moderately deep and deep to sand and gravel, nearly level to strongly sloping, well drained and moderately well drained soils that formed in silty material and loamy outwash material and have a loamy subsoil

This map unit is on an outwash plain. It is made up of silty material that is underlain by loamy outwash and sand and gravel.

This map unit occupies about 8 percent of the county. Bowes soils make up about 20 percent of it, Dresden soils make up about 20 percent, and Fox soils make up about 15 percent. The remaining 45 percent is minor soils.

Bowes soils are on nearly level to moderately sloping ridges and broad plains. The Dresden soils are on nearly level to moderately sloping ridges and knolls adjacent to Bowes soils. Fox soils are on nearly level to strongly sloping broad plains and ridges. They are adjacent to the Dresden soils.

Bowes soils are deep to sand and gravel and are well drained and moderately well drained. They have a very dark grayish brown silt loam surface layer and a yellowish brown silt loam subsurface layer. The subsoil is brown and yellowish brown silty clay loam in the upper part and brown and dark brown gravelly clay loam and gravelly sandy loam in the lower part. The Dresden soils are moderately deep to sand and gravel. They are well drained. They have a very dark grayish brown silt loam surface layer, and a subsoil that is brown to dark brown silty clay loam in the upper part and dark yellowish brown and brown to dark brown clay loam and sandy clay loam in the lower part. The Fox soils are moderately deep to sand and gravel. They are well drained. They have a dark grayish brown silt loam surface layer and a subsoil that is brown to dark brown and dark yellowish brown silty clay loam in the upper part and sandy clay loam and sandy loam in the lower part.

The minor soils in this map unit are the Waupecan, Millington, Harvard, and Harpster soils. The well drained Waupecan soils are on ridgetops and knolls. The poorly drained Millington soils are on bottom lands along the Fox River, and the well drained and moderately well drained Harvard soils are on ridgetops. The poorly drained Harpster soils are in depressions.

This map unit is used mainly for urban development. It has good potential for most urban uses and for cropland, pasture, and woodland.

The soils in this map unit have few limitations for urban development. The underlying sand and gravel allows rapid water movement downward, which may affect the suitability of these soils for sanitary facilities. Erosion is the main limitation when managing cropland. The soils in this map unit are used for pasture and woodland, and there are few concerns in management. They provide good habitat for woodland wildlife.

4. Waupecan-Drummer

Deep, gently sloping and nearly level, well drained and poorly drained soils that formed in silty material and loamy outwash material and have silty and loamy subsoils

This map unit is in an area of silty material that is underlain by loamy outwash and sand and gravel. It is characterized by many broad ridges and drainageways.

This map unit occupies about 5 percent of the county. Waupecan soils make up about 30 percent of it, and Drummer soils make up about 25 percent. The remaining 45 percent is minor soils (fig. 2).

Waupecan soils are on nearly level and gently sloping ridgetops and knolls. They are higher on the landscape than Drummer soils. Drummer soils are in drainageways and in depressions.

Waupecan soils are well drained. They have a very dark gray and very dark grayish brown silt loam surface layer. The subsoil is brown to dark brown silt loam and dark yellowish brown silty clay loam in the upper part and brown to dark brown and dark yellowish brown clay loam, sandy clay loam, and sandy loam in the lower part. Drummer soils are poorly drained. They have a black silty clay loam surface layer. The subsoil is mottled, very dark gray, dark gray, and grayish brown silty clay loam in the upper part and mottled sandy loam in the lower part.

The minor soils in this map unit are the Dresden, Elburn, Otter, and Warsaw soils. The well drained Dresden and Warsaw soils are in sloping areas of the landscape where sand and gravel are closer to the surface. They are adjacent to Waupecan soils. The somewhat poorly drained Elburn soils are on low lying ridges above Drummer soils. The poorly drained Otter soils are on bottom lands along major streams.

This map unit is used mainly as cropland. It has good potential for crops and pasture. The potential for urban land is good in areas of sloping soils and fair or poor in areas of poorly drained soils.

Providing adequate drainage in areas of poorly drained soils and erosion control in areas of sloping soils are the main management concerns for crops. Drained areas are well suited to crops and pasture. Varieties of grasses that can withstand wetness should be selected for pasture. The water table must be lowered before areas of poorly drained soils are suited to urban development. Well drained soils have few limitations for urban development.

Nearly level to moderately steep soils that are moderately permeable; on end moraines, ground moraines, and outwash plains

This group consists of seven map units that make up about 63 percent of the county. It is the largest group in the county. The predominant land use is cropland and pasture. Crops include corn, soybeans, wheat, and oats. Beef and dairy cattle and hog enterprises are important agricultural uses, also. There is urban development throughout the group, but it is most common in the easternmost map units. Many of the major soils in this group of map units are well suited to urban development.

5. Drummer-Elburn

Deep, nearly level to very gently sloping, poorly drained and somewhat poorly drained soils that formed in silty material and the underlying stratified loamy outwash and have silty and loamy subsoils

The Drummer-Elburn map unit is on broad outwash plains. It consists of nearly level drainageways and flats and broad, gently sloping ridges and knolls.

This map unit occupies about 9 percent of the county. Drummer soils make up about 40 percent of the map unit, and Elburn soils make up about 15 percent. The remaining 45 percent is minor soils.

Drummer soils are on upland flats and in drainageways. They are lower on the landscape than Elburn soils. Elburn soils are on low lying ridges and broad outwash plains and are slightly above Drummer soils on the landscape.

Drummer soils are poorly drained. They have a black silty clay loam surface layer and a subsoil that is mottled, very dark gray, dark gray, and grayish brown silty clay loam in the upper part and mottled, gray sandy loam in the lower part. Elburn soils are somewhat poorly drained. They have a black and very dark grayish brown silt loam surface layer and a subsoil that is mottled, brown to dark brown, dark grayish brown, and grayish brown silty clay loam in the upper part and light yellowish brown loam in the lower part.

The minor soils in the map unit are the Lena, Martinsville, Plano, Brenton, Mundelein, and Harpster soils. The very poorly drained Lena soils are in closed depressions and drainageways; the well drained Martinsville and Plano soils are on gently sloping and moderately sloping ridges; and the somewhat poorly drained Brenton and Mundelein soils are on low lying ridges and knolls. Poorly drained Harpster soils are in drainageways and depressions.

The soils in this map unit are used mainly for cultivated crops and pasture. They have good potential for cultivated crops and pasture, good or fair potential for woodland, and good to poor potential for many urban uses.

The major limitation is wetness in areas of poorly drained soils. Providing adequate drainage is the main management concern for cropland. When poorly drained soils are used for pasture, adapted grasses should be selected that can withstand wetness. Installing subsurface drainage systems makes these soils more suitable for some urban uses.

6. Drummer-Saybrook-Catlin

Deep, nearly level to moderately sloping, well drained, moderately well drained, and poorly drained soils that formed in loess and the underlying loam till and have silty and loamy subsoils

This map unit is a mantle of loess that varies in thickness and underlying loam glacial till. Geologically, it is part of the Malden Till area and is characteristically a nearly level to moderately sloping ground moraine.

This map unit occupies about 6 percent of the county. Drummer soils make up about 30 percent of this unit, Saybrook soils make up about 25 percent, and Catlin soils make up about 20 percent. The remaining 25 percent is minor soils (fig. 3).

The Drummer soils are in drainageways and depressions and are the lowest on the landscape. Saybrook soils are on nearly level to moderately sloping ridgetops and side slopes. They are in areas where the loam till is closest to the surface and are highest on the landscape. Catlin soils are on nearly level and gently sloping ridgetops and knolls.

Drummer soils are poorly drained. They have a black silty clay loam surface layer and a subsoil that is mottled, very dark gray, dark gray, and grayish brown silty clay loam in the upper part and gray, mottled sandy loam in the lower part. Saybrook soils are well drained and moderately well drained. They have a black silt loam surface layer and a brown to dark brown subsoil that is silt loam and silty clay loam in the upper part and clay loam and loam in the lower part. Catlin soils are well drained and moderately well drained. They have a very dark gray and very dark grayish brown silt loam surface layer and a subsoil that is brown to dark brown, dark yellowish brown, and yellowish brown silty clay loam in the upper part and brown to dark brown clay loam and heavy loam in the lower part.

The minor soils in the map unit are the Flanagan, Lisbon, Lena, Houghton, Proctor, and Elburn soils. The somewhat poorly drained Flanagan, Lisbon, and Elburn soils are on low lying ridges and knolls above Drummer soils; the well drained and moderately well drained Proctor soils are on gently sloping ridgetops near Catlin and Saybrook soils; and the very poorly drained Lena and Houghton soils are in closed depressions.

The soils in this map unit are used mainly for cropland. They have good potential for cropland and pasture. Sloping soils have good potential for urban uses. Poorly drained soils have fair to poor potential for urban uses.

Soil management practices that provide adequate drainage of poorly drained soils and control erosion on sloping soils are needed for cropland. When adequately drained, these soils are well suited to crops and pasture. In poorly drained areas, varieties of grasses that can withstand wetness should be selected for pasture. The water table must be lowered before poorly drained soils are suitable for urban development. Frost heave and shrink-swell potential also limit urban development of sloping soils.

7. Miami-Octagon

Deep, gently sloping to moderately steep, well drained soils that formed in a thin loess mantle and the underlying loamy till and have a loamy subsoil

Geologically, this map unit is within the Gilberts Till area and is characterized by end moraines, kamic ridges, and eskers.

This map unit occupies about 10 percent of the county. Miami soils make up about 30 percent of the unit, and Octagon soils make up about 15 percent. The remaining 55 percent is minor soils (fig. 4).

Miami and Octagon soils are in similar positions on the landscape. The unit is quite complex. In some places, the soils have sand and gravel close to the surface. In most areas, they are underlain by loam and sandy loam till. These soils are gently sloping to moderately steep throughout the area.

Miami soils have a very dark grayish brown silt loam surface layer and a brown silt loam subsurface layer. The subsoil is brown to dark brown and reddish brown clay loam. Octagon soils have a very dark brown silt loam surface layer and a brown to dark brown silt loam and clay loam subsoil.

Minor in the map unit are the Casco, Fox, Dodge, Drummer, Kidder, and Lena soils. The well drained Casco soils are shallow to sand and gravel, are strongly sloping to steep, and are on ridges; the well drained Kidder, Fox, and Dodge soils are gently sloping to strongly sloping and are on ridges and side slopes; Drummer soils are in drainageways and are poorly drained; and the very poorly drained Lena soils are in closed depressions.

The soils of this map unit are used for cultivated crops, pasture, urban development, and woodland. They have good to fair potential for these uses.

Erosion control and maintaining fertility are management concerns for cropland. Slope is a limitation for urban development. Areas of gently and moderately sloping soils are well suited to urban uses. Strongly sloping soils are moderately suited, and moderately steep soils are unsuited to urban uses. These soils have few limitations for pasture and woodland. Pasture and woodland must be carefully managed, however, in areas of moderately steep soils to minimize erosion.

8. Octagon-Saybrook-Drummer

Deep, nearly level to strongly sloping, well drained, moderately well drained, and poorly drained soils that formed in loess and the underlying loamy till and have silty and loamy subsoils

This map unit consists of end moraines in geologic areas of Malden Till and Tiskilwa Till. Topography is irregular.

This map unit occupies about 12 percent of the county. Octagon soils make up about 25 percent of this unit, Saybrook soils make up about 25 percent, and Drummer soils make up about 25 percent. The remaining 25 percent is minor soils.

Octagon soils are on gently sloping to strongly sloping ridges and side slopes. Slopes are short and uneven. Octagon soils are highest on the landscape and are adjacent to the native timber. Saybrook soils are on nearly level to moderately sloping ridgetops. Drummer soils are in nearly level drainageways and depressions and are lowest on the landscape.

Octagon soils are well drained. They have a very dark brown silt loam surface layer and a subsoil that is brown to dark brown silt loam and clay loam. Saybrook soils are well drained and moderately well drained. They have a black silt loam surface layer and a brown to dark brown subsoil that is silt loam and silty clay loam in the upper part and clay loam and loam in the lower part. Drummer soils are poorly drained. They have a black silty clay loam surface layer and a subsoil that is mottled, very dark gray, dark gray, and grayish brown silty clay loam in the upper part and gray, mottled sandy loam in the lower part.

The minor soils in the map unit are the Catlin, Lisbon, and Brenton soils. The well drained and moderately well drained Catlin soils are on ridgetops near Saybrook soils; and the somewhat poorly drained Lisbon and Brenton soils are on low lying ridges and knolls above Drummer soils.

The soils of this map unit are used mainly for cultivated crops and pasture. Some areas are used for urban development. They have good potential for cropland and pasture. The sloping soils have good potential for urban uses, and the poorly drained soils have fair potential.

Providing adequate drainage for poorly drained soils and controlling erosion on sloping soils are the main management concerns for crop and pasture. Wetness and frost heave in poorly drained soils and somewhat excessive slopes in well drained soils are limitations when this map unit is used for urban development.

9. Dodge-Birkbeck-Camden

Deep, nearly level to moderately sloping, well drained and moderately well drained soils that formed in loess and the underlying loamy till or stratified loamy outwash material and have silty and loamy subsoils

Geologically, this map unit is on a ground moraine of Malden Till. It is dissected by Big Rock and Welch Creeks. Short, strong slopes are adjacent to the major streams, and gentle to moderate slopes are in the rest of the area.

This map unit occupies about 3 percent of the county. Dodge soils make up about 30 percent of this unit, Birkbeck soils make up about 20 percent, and Camden soils make up about 20 percent. The remaining 30 percent is minor soils (fig. 5).

Dodge soils are on gently sloping and moderately sloping ridges and side slopes. They are near Birkbeck and Camden soils in areas where loam glacial till is close to the surface. Birkbeck soils are on nearly level to moderately sloping ridges. Camden soils are on nearly level to moderately sloping ridgetops and side slopes.

Dodge soils are well drained. They have a dark grayish brown silt loam surface layer and a subsoil that is dark yellowish brown silty clay loam in the upper part and yellowish brown clay loam and loam in the lower part. Birkbeck soils are moderately well drained. They have a dark grayish brown silt loam surface layer and a subsoil that is dark yellowish brown and brown silt loam and silty clay loam in the upper part and brown and dark yellowish brown clay loam and silty clay loam in the lower part. They are underlain by loam till. Camden soils are well drained and moderately well drained. They have a dark grayish brown silt loam surface layer and a brown silt loam subsurface layer. The subsoil is brown to dark brown clay loam in the upper part and yellowish brown silt loam in the lower part. The underlying material is stratified, loamy outwash.

The minor soils in this map unit are the Drummer, Otter, Batavia, Sabina, and Miami soils. The poorly drained Drummer soils are in nearly level drainageways; the poorly drained Otter soils are on bottom lands along Big Rock and Welch Creeks; the well drained and moderately well drained Batavia soils are on nearly level and gently sloping ridgetops; and the well drained Miami soils are on side slopes adjacent to the major streams.

The soils in this map unit are used mainly for crops and pasture. A few areas are in woodland, and some areas are urban. This map unit has good potential for cropland and pasture, urban development, and woodland.

Erosion control is the main management concern for growing cultivated crops and pasture. Frost heave and shrink-swell are limitations for urban development. These soils have few limitations for woodland.

10. Miami-Dodge

Deep, gently sloping to strongly sloping, well drained soils that formed in loess and the underlying loamy till and have silty and loamy subsoils

Geologically, this map unit is on end moraines in Malden Till and Tiskilwa Till. The landscape has an irregular topography of many short slopes, which are dissected by drainageways.

This map unit occupies about 11 percent of the county. Miami soils make up about 30 percent of the unit, Dodge soils make up about 30 percent, and the remaining 40 percent is minor soils.

Miami soils are on gently to strongly sloping ridges and side slopes. They are near Dodge soils in areas where glacial till occurs close to the surface. Dodge soils are on gently sloping and moderately sloping ridges.

Miami soils have a very dark grayish brown silt loam surface layer. The subsurface layer is brown silt loam, and the subsoil is brown to dark brown and reddish brown clay loam. Dodge soils have a dark grayish brown silt loam surface layer and a subsoil that is dark yellowish brown silty clay loam in the upper part and yellowish brown clay loam and loam in the lower part.

The minor soils in the map unit are Drummer, Herbert, Millbrook, and Octagon soils. The poorly drained Drummer soils are in drainageways and depressions; the somewhat poorly drained Herbert and Millbrook soils are in shallow depressions near drainageways; and the Octagon soils are on gently to strongly sloping ridges and side slopes.

The soils of this map unit are used mainly for cultivated crops and pasture. A few areas are in woodland, and some areas are used for urban development. These soils have good or fair potential for cultivated crops, good potential for pasture and woodland, and good to fair potential for urban uses.

Controlling erosion and maintaining soil fertility and tilth are the main management concerns for cropland and pasture. There are few soil limitations for woodland. Gently sloping and moderately sloping soils are well suited to urban uses. Strongly sloping soils are only moderately suited to urban uses.

11. Drummer-Harvard

Deep, nearly level to moderately sloping, poorly drained, well drained, and moderately well drained soils that formed in loess and the underlying stratified loamy outwash material and have silty and loamy subsoils

This map unit is on outwash plains and consists of gently sloping and moderately sloping ridges that are separated by nearly level drainageways.

This map unit occupies about 12 percent of the county. Drummer soils make up about 35 percent of this unit, and Harvard soils make up about 20 percent. The remaining 45 percent is minor soils (fig. 6).

Drummer soils are in nearly level drainageways and are lower on the landscape than Harvard soils. Harvard soils are on nearly level to moderately sloping ridges and knolls.

Drummer soils are poorly drained. They have a thick, black silty clay loam surface layer and a subsoil that is mottled, very dark gray, dark gray, and grayish brown silty clay loam in the upper part and mottled, gray sandy loam in the lower part. Harvard soils are well drained and moderately well drained. They have a very dark grayish brown silt loam surface layer and a brown to dark brown and yellowish brown subsoil that is silty clay loam in the upper part and clay loam in the lower part.

Minor soils in the map unit are the Brenton, Millbrook, Camden, St. Charles, Batavia, Martinsville, Selma, and Virgil soils. Brenton, Millbrook, and Virgil soils are somewhat poorly drained and are on nearly level, low lying ridges and knolls. They are between Drummer and Harvard soils on the landscape. The well drained and moderately well drained Batavia, Camden, and St. Charles soils are on ridgetops and knolls. They are adjacent to Harvard soils on the landscape. The well drained Martinsville soils are on gently sloping and moderately sloping ridges and side slopes adjacent to Harvard soils. The poorly drained Selma soils are in drainageways near Drummer soils.

This map unit is used mainly for crops and pasture. It has good potential for crops and pasture. The sloping soils are well suited to urban uses and the poorly drained soils have fair to poor potential for urban uses.

Providing adequate drainage of poorly drained soils and controlling erosion of sloping soils are the main management concerns for cropland and pasture. Wetness and shrink-swell potential are limitations for urban development.

Nearly level to moderately sloping soils that are moderately permeable; on uplands, terraces, and flood plains

This group has one map unit that makes up about 4 percent of the county. Uplands are heavily urbanized and bottom lands are used for recreation, woodland, and pasture. Inactive limestone quarries are also in this unit.

12. Dresden-Millington

Moderately deep to sand and gravel and deep, nearly level to moderately sloping, well drained and poorly drained soils that formed in loamy alluvium or outwash material and have a loamy subsoil

This map unit is on the Fox River bottom lands and adjacent uplands. The alluvial bottom-land soils are nearly level. The gently sloping and moderately sloping upland soils are underlain by sand and gravel.

This map unit occupies about 4 percent of the county. Dresden soils make up about 50 percent of the unit, Millington soils make up about 15 percent, and the remaining 35 percent is minor soils.

Dresden soils are on nearly level to moderately sloping ridges. They are the highest soils on the landscape. Millington soils are on bottom lands.

Dresden soils are well drained. They have a very dark grayish brown silt loam surface layer and a subsoil that is brown to dark brown silty clay loam in the upper part and dark yellowish brown and brown to dark brown clay loam and sandy loam in the lower part. They are underlain by sand and gravel. Millington soils are poorly drained. They have a black loam and silty clay loam surface layer and a subsoil that is stratified, black and very dark gray sandy loam and silty clay loam.

The minor soils in the map unit are the Faxon, Ripon, Rodman, Otter, and Fox soils. The well drained Ripon soils are on gently sloping ground moraines that were topographically shaped by the underlying bedrock. The excessively drained Rodman soils are on moderately steep and steep, gravelly ridges; the poorly drained Otter soils are on nearly level bottom lands; the well drained Fox soils are on gently sloping to strongly sloping ridges; and the poorly drained Faxon soils are on bottom lands and are underlain by limestone bedrock.

Sloping soils in this map unit are used mainly for urban development. The bottom lands are used for woodland, pasture, and recreation. Sloping soils have good potential for urban uses. Poorly drained bottom lands have poor potential for urban uses.

Bottom lands are best suited to woodland, recreation, and wildlife. They are limited for urban uses by wetness and flooding. When drained and protected from flooding, bottom lands are also suited to pasture and cropland. Sloping soils are well suited to urban uses. There is a potential for contamination of ground water supplies when sanitary facilities are located in this map unit.

Nearly level to moderately steep soils that are moderately slowly and slowly permeable; on end moraines

This group consists of two map units that make up about 14 percent of the county. The map units are located in the more urbanized, eastern part of the county. In addition to urban development, these map units are used to grow corn, soybeans, wheat, oats, pasture, and hay. A few beef cattle and hog enterprises are also in the area.

13. Morley-Beecher

Deep, nearly level to moderately steep, well drained to somewhat poorly drained soils that formed in a thin loess mantle and the underlying loamy till and have loamy and clayey subsoils

This map unit is on end moraines. Geologically, it is on part of the Yorkville Till. It is characterized by ridges and short, uneven slopes, which are dissected by drainageways.

The Morley-Beecher map unit occupies about 5 percent of the county. The Morley soils make up about 50 percent of this map unit, Beecher soils make up about 25 percent, and the remaining 25 percent is minor soils.

Morley soils are on ridges and side slopes. They are higher on the landscape than Beecher soils. Beecher soils are on broad ridgetops and knolls.

Morley soils are well drained and moderately well drained. They have a very dark grayish brown silt loam surface layer and a brown silt loam subsurface layer. The subsoil is brown to dark brown silty clay loam and silty clay. It is mottled in the lower part. Beecher soils are somewhat poorly drained. They have a very dark grayish brown silt loam surface layer and a dark grayish brown silt loam subsurface layer. The subsoil is dark grayish brown, light olive brown, and olive brown silty clay loam and silty clay in the upper part and light olive brown silty clay loam in the lower part.

The minor soils in the map unit are Milford, Wauconda, Millbrook, and Zurich soils. The poorly drained Milford soils are in drainageways; the somewhat poorly drained Millbrook and Wauconda soils are on broad, nearly level ridges and knolls underlain by loamy outwash; and the well drained Zurich soils are on gently sloping ridgetops.

This map unit is used for urban development, cropland, pasture, and woodland. It has fair to poor potential for urban development, good to fair potential for cropland, and good potential for pasture and woodland.

Providing adequate drainage of somewhat poorly drained soils and controlling erosion on sloping soils are the main concerns in managing cropland. Soil management practices that maintain fertility, organic-matter content, and tilth are also needed. Wetness, a slow rate of water movement downward through the soil, and the somewhat excessive slope are limitations for urban development. The map unit has few limitations when it is used for woodland and pasture.

14. Milford-Varna-Markham

Deep, nearly level to moderately sloping, poorly drained, well drained, and moderately well drained soils that formed in a thin silty mantle and the underlying loamy till or sediment and have loamy and clayey subsoils

This map unit is in drainageways and on end moraines. Geologically, this unit is part of the Yorkville Till. It is characterized by ridges and knolls, which are dissected by drainageways and depressions.

The Milford-Varna-Markham map unit occupies about 9 percent of the county. Milford soils make up about 30 percent of the map unit, Varna soils make up 25 percent, and Markham soils make up 15 percent. The remaining 30 percent is minor soils (fig. 7).

Milford soils are in drainageways and on flats. They are lower on the landscape than Varna and Markham soils. Markham and Varna soils are on morainic ridgetops and side slopes. Markham soils are adjacent to areas of native timber and Varna soils are in areas of native prairie grasses.

Milford soils are poorly drained. They have a black silty clay loam surface layer. The subsoil is very dark gray and dark gray silty clay in the upper part and gray and olive gray silty clay loam in the lower part. Varna soils are well drained and moderately well drained. They have a very dark gray silt loam surface layer. The subsoil is brown to dark brown and dark yellowish brown silty clay loam in the upper part and yellowish brown silty clay loam in the lower part. Markham soils are well drained and moderately well drained. They have a very dark grayish brown silt loam surface layer. The subsoil is brown to dark brown and dark yellowish brown silty clay loam in the upper part and yellowish brown and light yellowish brown silty clay loam in the lower part.

The minor soils in this map unit are the Elliott, Morley, and Peotone soils. The somewhat poorly drained Elliott soils are on nearly level, slight rises above Milford soils; the well drained and moderately well drained Morley soils are on gently sloping to strongly sloping ridges and side slopes adjacent to Varna and Markham soils.

The soils in this map unit are used for cropland, pasture, and urban development. They have good potential for cultivated crops, fair to poor potential for urban development, and good potential for pasture.

Providing adequate drainage in areas of poorly drained soils and controlling erosion in areas of sloping soils are the main management concerns for crops. There are few limitations for pasture. Varieties of adapted grasses that can withstand wetness should be selected for areas of poorly drained soils. The suitability of these soils for urban development is limited by wetness and the slow rate of water movement downward through the soils. Poorly drained soils are unsuited to many urban uses and well drained and moderately well drained soils are moderately suited to urban uses.

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 each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a similar profile make up a *soil series.* Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Batavia series, for example, was named for the town of Batavia in Kane County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Saybrook silt loam, 0 to 2 percent slopes, is one of several phases within the Saybrook series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Faxon-Ripon complex is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Rodman soils is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits, gravel, is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

24B—Dodge silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops, knolls, and side slopes. Areas are irregular in shape and range from 5 to 70 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is dark yellowish brown silty clay loam, the middle part is yellowish brown clay loam, and the lower part is yellowish brown loam. The underlying material, to a depth of about 60 inches, is yellowish brown calcareous loam till. In places the subsoil is thicker and depth to calcareous loam is greater than it is in the typical profile. Some areas have a thicker and darker surface layer. Some areas of this map unit in the northeastern part of the county have calcareous sandy loam in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction varies in the surface layer according to local liming practices, but it is commonly neutral. Reaction ranges from strongly acid to neutral in the subsoil. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, the surface may crust or puddles may form on it after hard rains.

Most areas of this soil are farmed, but small areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to good for most urban uses.

This soil is well suited to corn, soybeans, wheat, oats, and grasses and legumes for hay and pasture. Erosion is the main hazard if the soil is used for cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and countouring. Returning crop residue and adding animal manure help to maintain the organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce the amount of soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It has high frost heave potential and has moderate shrink-swell potential in the subsoil. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is moderately well suited to dwellings without basements. The moderate shrinking and swelling of the subsoil can cause uneven settling of foundations; as a result, walls crack. This problem can be avoided by strengthening or by adding sand and gravel to the foundation backfill. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, and a homogeneous mixture of subsoil and underlying material should be used for subgrade.

This soil is well suited to septic tank absorption systems. The moderately slow rate of water movement in the underlying material is a concern in places, but can be offset by increasing the size of the absorption field.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface layer that can withstand heavy foot traffic. Few limitations restrict the use of this soil for camp areas, picnic sites, trails, footpaths, and bridle paths. Some leveling may be required before the soil can be made suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to reduce the amount of dust in dry weather. Capability subclass IIe.

24C2—Dodge silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on convex ridgetops and short, uneven side slopes. Areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is dark yellowish brown and yellowish brown silty clay loam, and the lower part is light yellowish brown and yellowish brown clay loam. The underlying material, to a depth of 60 inches, is yellowish brown calcareous loam. In places the surface layer is thicker and darker than typical. In some areas the subsoil is thinner and the underlying calcareous loam is closer to the surface. In some areas in the northeastern part of the county, the underlying material is sandy loam.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices, but is commonly neutral. Reaction in the subsoil is medium acid to neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it may crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is fair for crops and fair to good for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for growing cultivated crops. Minimum tillage, terracing, contouring, and grassed waterways help to reduce soil loss. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce the amount of soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability, however, because of the high frost heave potential. Also, the shrink-swell potential in the subsoil is moderate. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because it lacks sufficient stability in the subsoil, but this deficiency can be corrected by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing local streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary.

This soil is well suited to septic tank absorption systems. In places the moderate rate of water movement in the underlying material is a concern, but problems can be avoided by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface layer that withstands heavy foot traffic. There are few limitations for the construction and use of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before this soil is used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control the amount of wind and water erosion. Capability subclass IIIe.

27B—Miami silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops, knolls, and short, uneven side slopes. Areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 7 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is brown to dark brown clay loam, and the lower part is reddish brown clay loam. The underlying material, to a depth of 60 inches, is brown calcareous loam. In places the surface layer is thicker and darker than typical. Also, in some areas the subsoil is thicker and depth to calcareous loam is greater than it is in the typical profile. In some areas in the northeastern part of the county, the underlying material is calcareous sandy loam.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies according to local liming practices, but it is commonly neutral. The subsoil is medium acid to mildly alkaline. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it has a tendency to crust or puddle after hard rains.

Most areas of this soil are farmed, but some areas are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is used for growing cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is suitable for urban development if proper design and installation procedures are used. The water table is generally below a depth of 5 feet. The soil lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is well suited to dwellings with and without basements. Frost heave is a concern when constructing local streets and roads but can be minimized by replacing subgrade material.

This soil is only moderately well suited to septic tank absorption fields because of the moderate percolation rate in the subsoil and underlying material. This limitation is corrected by increasing the size of the absorption fields. Seepage is a concern when constructing sewage lagoons. Sealing the bottoms of lagoons improves suitability.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide a firm surface layer that can withstand heavy foot traffic. There are no soil limitations for camp areas, picnic areas, trails, footpaths, and bridle paths. In places leveling is required to make this soil suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

27C2—Miami silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on convex ridges, knolls, and short, uneven side slopes. Areas are irregular in shape and range from 3 to 280 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 25 inches thick. The upper part of the subsoil is brown clay loam, and the lower part is dark yellowish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous brown loam. In places the surface layer is thicker and darker and in some areas depth to calcareous loam till is greater. In some small areas the surface layer is clay loam because it is mixed with the subsoil by tillage.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. Reaction in the subsoil is slightly acid to neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it has a tendency to crust or become puddled after hard rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are farmed. The potential is good to fair for crops and most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for cultivated crops. Conservation tillage, terracing, contouring, and grassed waterways help to reduce the amount of soil loss. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing local streets and roads but can be minimized by replacing subgrade material. Some grading is necessary in places. The soil is suited to septic tank absorption fields. In places the rate of water movement in the subsoil is a concern, but problems can be avoided by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and silt loam texture provide a firm surface layer that can withstand heavy foot traffic. There are few limitations for the construction and placement of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed, however, before these areas can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

27D2—Miami silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on convex knolls and side slopes. Areas are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 22 inches thick. The upper part is brown clay loam, and the lower part is dark yellowish brown clay loam. The underlying material, to a depth of 60 inches, is yellowish brown calcareous loam. In places calcareous loam is deeper. Also, in some areas where the upper part of the subsoil has been mixed with the surface layer during tillage, the surface layer is clay loam. Areas in the northeastern part of the county contain calcareous sandy loam underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up less than 10 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral or slightly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it may crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed. The potential is fair for crops and most urban uses.

This soil is better suited to grasses and legumes grown for hay and pasture than to other uses. Corn and soybeans can be grown as part of a cropping system if erosion is controlled; however, a cropping system in which more small grains are grown than corn and soybeans would be more suitable. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, grassed waterways, and conservation tillage help reduce the amount of soil erosion.

This soil is suited to some urban uses if proper design and engineering procedures are used. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate. There is insufficient stability in the surface layer due to the moderate shrink-swell potential and in the subsoil due to the moderate frost heave potential. Slope ranges from 10 to 15 percent.

This soil is only moderately suited to dwellings both with and without basements because of the somewhat excessive slope and the lack of sufficient stability and strength in the subsoil. Grading helps to correct limitations caused by slope, and stability can be improved by strengthening or replacing the base material. Frost heave and slope are concerns when constructing local streets and roads. Slope restrictions can be corrected by grading, and the hazard of frost heave can be reduced by replacing the subgrade material.

This soil is only moderately suited to septic tank absorption fields because of the somewhat excessive slope and the moderately slow percolation rate in the subsoil and underlying material. Increasing the size of the absorption field and grading are helpful. Slope and excessive seepage are concerns when constructing sewage lagoons. Grading and sealing the bottom of lagoons will improve them.

This soil is suited to some recreation uses. Few limitations exist for footpaths, trails, and bridle paths. Camp areas and picnic areas require some leveling before construction is feasible. Use of this soil for playgrounds requires extensive leveling. Proper placement of trees, shrubs, and other vegetation is important in the control of erosion. Capability subclass IVe.

27D3—Miami clay loam, 10 to 15 percent slopes, severely eroded. This strongly sloping, well drained soil is on convex knolls and side slopes. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is brown to dark brown clay loam about 5 inches thick. The subsoil is reddish brown clay loam about 16 inches thick. The underlying material, to a depth of 60 inches, is light reddish brown, calcareous loam. In some areas depth to calcareous loam is greater.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils in shallow depressions and drainageways. They make up 0 to 5 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from slightly acid to mildly alkaline. Natural fertility is low, and organic-matter content is low. The surface layer is generally friable, but in places is sticky when wet and hard and cloddy when dry. Conditions are better for cultivation when the soil is not saturated.

Most areas of this soil are farmed. The potential is poor to fair for crops and fair for most urban uses.

This soil is better suited to grasses and legumes grown for hay and pasture than it is to other uses. Corn and soybeans can be grown in the cropping system if erosion is controlled. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, grassed waterways, and conservation tillage help reduce soil erosion. Terracing is limited in some areas by short, uneven slopes and irregular topography.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate. The water table is usually below a depth of 5 feet.

This soil is only moderately suited to dwellings without basements because of slope and lack of stability in the subsoil. Stability can be improved by strengthening or replacing base material. This soil is only moderately suited to dwellings with basements because of slope. Frost heave is a concern when constructing streets and roads but can be minimized by replacing base material.

This soil is only moderately suited to installation of septic tank absorption fields because of slope, which in places restricts their size. In places slopes may need grading. The rate of water movement in the subsoil is also a problem in places but can be corrected by increasing the size of the absorption field. This soil is only moderately suited to area-type sanitary landfills because of slope.

This soil is suited to some recreation uses. There are few limitations to the use of this soil for footpaths, trails, and bridle paths. Camp areas require some leveling before construction is feasible. Use of this soil for playgrounds requires extensive leveling. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Capability subclass VIe.

59—Lisbon silt loam. This level or nearly level, somewhat poorly drained soil is in drainageways and on flats on uplands. Areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 13 inches thick. The subsoil is about 26 inches thick. The upper part is mottled, brown to dark brown and yellowish brown silty clay loam, and the lower part is mottled, brown and yellowish brown clay loam and loam. The underlying material, to a depth of 60 inches, is calcareous, mottled, light yellowish brown loam till. In places the surface layer is thinner and lighter, and in places, stratified outwash material is in the underlying material. In some areas where the subsoil is thicker, depth to the calcareous loam underlying material is greater.

Included with this soil in mapping are small areas of well drained and moderately well drained Saybrook soils on slight rises and poorly drained Drummer soils in shallow depressions and drainageways. These soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil ranges from mildly alkaline to slightly acid. Natural fertility, organic-matter content, and available water capacity are all high. The surface layer is friable and easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and to grasses and legumes grown for hay and pasture. In places wetness is a problem when the soil is used for cultivated crops. Where wetness is a problem, tile drains and shallow surface ditches can be installed to improve drainage. Returning crop residue and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil is suited to many urban uses if proper design and installation procedures are used. Depth to the seasonal water table is 1 foot to 3 feet. The soil lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and lack of sufficient stability in the subsoil. The amount of subsurface water can be decreased by installing drain tiles, and the stability can be improved by strengthening or replacing the base material. It is more difficult to lower the subsurface water to a desired level for construction of dwellings with basements. Frost heave is a concern when building streets and roads, but problems can be avoided by strengthening or replacing subgrade material. Use of this soil for septic tank absorption fields is limited by wetness. Adding fill material and constructing subsurface drainage systems improve suitability for this use. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is also limited by wetness. Seepage is also a problem, but this can be overcome by sealing the bottoms of lagoons.

This soil is moderately suited to most recreation uses. Wetness is the main problem and can be overcome through the use of tile drains or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust and makes areas of this map unit more attractive. Capability class I.

60C2—La Rose loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained and well drained soil is on convex knolls and side slopes. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is brown clay loam about 12 inches thick. The underlying material, to a depth of 60 inches, is calcareous, light yellowish brown loam till. In places the surface layer is lighter in color. In some areas the subsoil is thicker and depth to calcareous loam is greater. In areas where the upper part of the subsoil has been mixed with the surface layer during tillage, the surface layer is clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Lisbon soils in shallow depressions and drainageways. They make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices, but it is commonly mildly alkaline. The subsoil is mildly alkaline. The surface layer is friable and easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for growing cultivated crops. Conservation tillage, terracing, contouring, and grassed waterways help to reduce soil loss. Returning crop residue and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. Slopes in some areas are too short and uneven for terracing.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential, and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but this can be corrected by strengthening or replacing the base material and placing footings below frost level. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing subgrade material. Some grading may also be necessary.

This soil is moderately suited to septic tank absorption systems. In places the rate of water movement in the subsoil is a concern, but problems can be avoided by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and loam texture provide the firm surface required for heavy foot traffic. There are few limitations for the construction and placement of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed where areas of this soil are to be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

60D2—La Rose loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained and moderately well drained soil is on knolls and side slopes. Areas are oblong and narrow in shape and range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam about 7 inches thick. The subsoil is brown to dark brown clay loam about 13 inches thick. The underlying material, to a depth of about 60 inches, is yellowish brown calcareous loam till. In places the subsoil is thicker and depth to calcareous loam is greater. Where the upper part of the subsoil has been mixed with the surface soil by cultivation, the surface layer is brown to dark brown clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Lisbon soils. They are in drainageways and make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Available water capacity is moderate. Reaction varies in the surface layer according to local liming practices, but it is commonly neutral. Reaction is neutral or mildly alkaline in the subsoil. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled through a fairly wide range in moisture content. Root development is somewhat restricted below a depth of about 25 inches by compact loamy glacial till.

Most areas of this soil are farmed. The potential is fair for cultivated crops; good for hay, pasture, and trees; and fair for most urban uses.

This soil is suited to grasses and legumes grown for hay and pasture. Corn and soybeans can be grown as part of a cropping system if erosion is controlled. A cropping system that consists mainly of small grain and legumes reduces soil loss. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, grassed waterways, and conservation tillage help reduce soil erosion. Terracing is limited in some areas by short, uneven slopes and irregular topography.

This soil can support openland and woodland wildlife if field borders of grasses and legumes or hedgerows of hardwood and coniferous woody plants are established.

This soil is suitable for some urban uses if proper design and engineering procedures are used. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate. The soil lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. Slopes range from 10 to 15 percent.

This soil is only moderately suited to dwellings both with and without basements because of the somewhat excessive slope and the lack of sufficient strength and stability in the subsoil. Grading can help correct slope limitations, and stability can be improved by strengthening or replacing the base material. Frost heave and slope are problems for construction of local streets and roads. Slope restrictions can be reduced by grading, and the hazard of frost heave can be reduced by replacing the subgrade material.

This soil is only moderately suited to septic tank absorption fields because of the somewhat excessive slope and the moderately slow percolation rate in the subsoil and underlying material. Increasing the size of the absorption field and grading will help to avoid problems. Slope and sidehill seepage are concerns when constructing sewage lagoons. Grading and sealing the bottoms of lagoons will help to avoid problems.

This soil is suited to some recreation uses, such as footpaths, trails, and bridle paths. Camp areas and picnic areas require some leveling before development is feasible. Extensive leveling is required before this soil can be used for playgrounds. Areas are well suited to winter sports. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Capability subclass IVe.

62—**Herbert silt loam.** This nearly level, somewhat poorly drained soil is in drainageways and shallow depressions and on broad, low-lying ridges of till plains. Areas are irregular in shape and range from 5 to 35 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 27 inches thick. The upper part is brown to dark brown, mottled silty clay loam; the middle part is brown, mottled clay loam; and the lower part is yellowish brown, mottled clay loam. The underlying material, to a depth of about 60 inches, is light yellowish brown, mottled calcareous loam till. In places the surface layer is thinner and lighter colored, and in other places it is thicker and darker colored. In some places where the subsoil is thicker, depth to the calcareous loam underlying material is greater.

Included with this soil in mapping are small areas of well drained Dodge soils on more sloping areas of the landscape and poorly drained Drummer soils in drainageways. These included soils make up 5 to 15 percent of this map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction in the surface layer varies according to local liming practices, but it is commonly neutral. The subsoil is medium acid to mildly alkaline. Natural fertility and available water capacity are high, and organic-matter content is moderate. The surface layer is friable and can be easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and to grasses and legumes grown for hay and pasture. In places wetness is a concern when the soil is used for cultivated crops. Where wetness is a problem, tile drains can be installed to improve drainage. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is suited to many urban uses if proper design and installation procedures are used. Depth to the seasonal water table is 1 foot to 3 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability in the subsoil. The water table can be lowered by installing tile. Stability can be improved by strengthening or replacing the base material. Lowering the water table enough for construction of dwellings with basements is more difficult. Frost heave is a concern when constructing streets and roads, but problems can be avoided by strengthening or replacing subgrade material.

Use of this soil for septic tank absorption fields is limited by wetness. Adding fill material and constructing subsurface drainage systems are helpful procedures. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by seepage.

This soil is only moderately suited to most recreation uses. Wetness is the main problem, but this can be overcome by installing tile drains or providing shallow surface ditches. The use of trees, shrubs, and grasses reduces erosion, improves trafficability, and increases the esthetic value of the area. Capability class I.

67—**Harpster silty clay loam.** This level to nearly level, poorly drained soil is in closed depressions, in drainageways, and on very slight rises. Areas are rounded or oval and range from 3 to 40 acres in size.

Typically, the surface layer is calcareous, black silty clay loam about 14 inches thick. The subsoil is about 26 inches thick. The upper part is calcareous, mottled, gray silty clay loam; the middle part is calcareous, mottled, gray to light gray silty clay loam; and the lower part is calcareous, mottled, gray to light gray silt loam. The underlying material, to a depth of 60 inches, is calcareous, stratified, grayish brown and light olive brown silt loam and sandy loam outwash. In places the surface layer and subsoil do not contain free carbonates. In some areas, stratified outwash is closer to the surface than typical.

Included with this soil in mapping are small areas of somewhat poorly drained Mundelein soils and well drained and moderately well drained Proctor soils on slight rises. These included soils make up 0 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to ponded. Reaction in the surface layer varies with local liming practices but is commonly moderately alkaline. The subsoil is moderately alkaline. Natural fertility is high, and organic-matter content is very high. The surface layer is friable but becomes compact and cloddy if tilled when wet.

Most areas of this soil are farmed, but some areas in the county are used for urban development. The potential is good for crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and to grasses and legumes grown for hay and pasture. Wetness is the main problem when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage. If the soil is plowed in the fall and left bare, wind erosion may occur during spring. Winter cover crops or conservation tillage help reduce erosion. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the seasonal water table is less than 1 foot. This soil is also subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential, and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

Areas of this soil that are used for urban development need to be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of the difficulty in lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for local streets and roads is limited by wetness, flooding, and frost heave potential. Installing drainage systems and use of fill material make this soil more suitable for streets and roads.

Conventional septic tank absorption fields should not be constructed because of wetness and flooding. All sanitary facilities should be connected to commercial sewers and treatment plants. Use of this soil for sewage lagoons is limited by wetness, flooding, and the hazard of seepage. Flood protection and sealing the bottom of the lagoon are helpful practices. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main problem but can be overcome by using tile drains and surface ditches. Capability subclass IIw.

69—Milford silty clay loam. This level or nearly level, poorly drained soil is on upland flats and in depressions. Areas are irregular in shape and range from 5 to 700 acres in size.

Typically, the surface layer is black silty clay loam about 15 inches thick. The subsoil is about 38 inches thick. The upper part is mottled, very dark gray and dark gray silty clay; the middle part is mottled, gray silty clay loam; and the lower part is mottled, olive gray and gray silty clay loam. The underlying material, to a depth of 60 inches, is mottled, light gray and gray silty clay loam. In some areas the surface layer is thicker than typical. In places there is less clay in the subsoil and underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Elliott soils. They are on slight rises and make up less than 15 percent of the map unit.

Water and air move through this soil at a moderately slow rate, and surface runoff from cultivated areas is slow to ponded. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral. Natural fertility is high, and organic-matter content is very high. The surface layer is friable but becomes compact and cloddy if tilled when wet. Available water capacity is high.

Most areas of this soil are farmed. The potential is good for crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main problem when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage. If the soil is plowed in the fall and left bare, wind erosion may occur during winter and spring. Winter cover crops or conservation tillage helps reduce erosion. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the seasonal water table is less than 1 foot. This soil is subject to occasional flooding and ponding. It lacks sufficient stability because it has high frost heave potential and the subsoil has high shrink-swell potential. Water moves downward through the subsoil at a moderately slow rate.

Areas of this soil used for urban development need to be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of difficulty in lowering the water table. Dwellings without basements should be constructed with footings designed to withstand the shrinking and swelling. Drainage systems are needed to lower the water table. Use of this soil for streets and roads is limited by wetness, shrink-swell potential, and frost heave potential. Installation of drainage systems and use of fill material make this soil more suitable for streets and roads.

Conventional septic tank absorption fields should not be constructed because of wetness and moderately slow permeability. Sanitary facilities should be connected to commercial sewers and treatment plants if possible. This soil is well suited to construction of sewage lagoons. Onsite investigation is essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main problem, but it may be overcome by using tile drains and surface ditches. The surface soil is subject to wind erosion. Proper placement of trees, shrubs, and other vegetation helps control erosion. Capability subclass IIw.

76—**Otter silt loam.** This nearly level or level, poorly drained soil is on flood plains and alluvial bottom lands adjacent to streams (fig. 8). Areas are linear and range from 20 to 100 acres in size.

Typically, the surface layer is black silt loam about 28 inches thick. The subsoil is mottled, dark grayish brown silt loam about 11 inches thick. The underlying material, to a depth of 60 inches, is calcareous, stratified, mottled, dark gray and gray silt loam and loam. In places the surface layer is thinner than typical and is silty clay loam. In places free carbonates are in the surface layer and subsoil. The underlying material contains sand and gravel in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and Brenton soils and well drained and moderately well drained Proctor soils. These soils are on slight rises and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to ponded. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil is neutral or mildly alkaline. Natural fertility is high, and organic-matter content is very high. The surface layer is friable but will become compact and cloddy if tilled when wet. Available water capacity is high.

Most areas of this soil are farmed or left in woodland, but some areas are used for urban development. The potential is good for crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main problem when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage if a suitable outlet can be found. Areas need to be protected from flooding. If the soil is plowed in the fall and left bare, wind erosion may occur during winter and spring. Winter cover crops or conservation tillage help reduce erosion. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the water table is frequently less than 1 foot. This soil is also subject to frequent flooding. It lacks sufficient stability because frost heave potential is high. Water moves downward through the soil at a moderate rate.

Areas of this soil used for urban development must be artificially drained and protected from flooding. Dwellings, with or without basements, should not be constructed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave potential. Flood protection, installation of drainage systems, and use of fill material will make the soil more suitable for this use. Septic tank absorption fields should not be constructed because of wetness and flooding. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage. Flood protection and sealing the bottoms of lagoons are helpful practices. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness, the main problem, can be overcome by using tile drains and surface ditches. Game birds and songbirds will be attracted to these areas if proper habitat is provided. Capability subclass IIw.

82—**Millington loam.** This nearly level or level, poorly drained soil is on alluvial bottom lands adjacent to streams. Areas are linear and range from 10 to 150 acres in size.

Typically, the surface layer is calcareous black loam and mottled, black silty clay loam about 28 inches thick. The subsoil is calcareous, stratified, mottled, very dark gray and black sandy loam and silty clay loam about 14 inches thick. The underlying material, to a depth of 60 inches, is calcareous, mixed dark grayish brown and light gray sandy loam and gravelly loam. In some places the surface layer is thinner and is silt loam or silty clay loam. In some areas the surface layer and subsoil do not contain free carbonates. Limestone bedrock is the underlying material in some areas along the Fox River.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and Mundelein soils and well drained and moderately well drained Proctor soils. These soils are on slight rises and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to ponded. The surface layer is commonly mildly alkaline. The subsoil is mildly alkaline or moderately alkaline. Natural fertility is high, and organic-matter content is very high. The surface layer is friable, but it becomes compact and cloddy if tilled when wet. The available water capacity is high.

Most areas of this soil are farmed or are left in woodland, but some areas are used for urban development. The potential is good for growing crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main problem when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage if a suitable outlet can be found. Areas also need to be protected from flooding. If the soil is plowed in fall and left bare, wind erosion may occur during spring and winter. Winter cover crops or conservation tillage reduce erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the water table is frequently less than 1 foot. This soil is subject to frequent flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

Areas of this soil that are used for urban development must be artificially drained and protected from flooding. Dwellings, either with or without basements, should not be constructed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave potential. Flood protection, installation of drainage systems, and use of fill material are helpful practices. Septic tank absorption fields should not be constructed because of wetness and flooding. All sanitary facilities should be connected to commercial sewers and treatment plants. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage hazard, but it can be helped by flood protection and sealing the bottoms of lagoons. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness and flooding are the main concerns, but problems can be overcome by use of tile drains, surface ditches, and flood protection. Game birds and songbirds are attracted to these areas if proper habitat is provided. Capability subclass IIw.

93F—Rodman soils, 15 to 30 percent slopes. These moderately steep and steep, excessively drained soils are on kamic ridges and side slopes. Areas are long and narrow and range from 5 to 90 acres in size.

Typically, the surface layer is very dark gray sandy loam about 7 inches thick. The subsoil is brown to dark brown gravelly loam about 4 inches thick. The underlying material, to a depth of 60 inches, is brown to dark brown gravelly sand. In places the surface layer is lighter in color and the depth to underlying gravelly sand is greater. In other places the surface layer is eroded and gravelly sand is exposed.

Included with these soils in mapping are small areas of poorly drained Will soils. They occupy shallow depressions and drainageways and make up less than 10 percent of the unit.

Water and air move through the surface layer and subsoil at a moderately rapid rate and through the underlying material at a very rapid rate. Surface runoff is medium. Reaction in the surface layer is commonly neutral. Reaction in the subsoil is neutral. Natural fertility is low, and organic-matter content is moderate. Available water capacity is very low. The surface layer is friable, but it may be difficult to till because of cobbles or other stones at or near the surface. Excessive slope also restricts the use of farm machinery.

Most areas of these soils are in pasture and woodland. Some areas in the eastern part of the county are used for recreation. The potential is poor for cultivated crops and poor for most urban uses.

These soils are not suited to intensive use for row crops such as corn and soybeans because of droughtiness, slope, and erosion hazard. Careful management is needed to control erosion and maintain fertility and adequate plant cover. These soils are best suited to grasses and legumes grown for hay and pasture. Terracing and contouring are limited in some areas by irregular topography and by gravelly sand near the surface.

Forage can be produced on these soils. Overgrazing reduces plant vigor and often results in excessive runoff and erosion. Droughtiness is the main limiting factor in forage production. Proper stocking rates, pasture rotation, and limited grazing help to keep the pasture plants and soil in good condition and minimize soil erosion. Excessive slope may restrict the use of farm machinery in planting and harvesting.

These soils are not suited to most urban uses because of excessive slope. Alternative sites for urban development should be selected. The water table is usually below a depth of 6 feet. Water moves downward through the surface layer and subsoil at a moderately rapid rate and through the underlying material at a very rapid rate. Because of the very rapid permeability of the underlying material, there is a potential for pollution of ground water when sanitary facilities are installed.

These moderately steep and steep soils are not suited to most recreation uses, but they are well suited to winter sports. Because of excessive slope, these soils are moderately limited for paths and trails. These soils are severely limited for use as camp or picnic areas; extensive leveling is required. Playgrounds should not be constructed. Proper placement of trees, shrubs, and other ornamentals and seeding grasses are important for controlling erosion. Also, proper vegetative cover attracts a variety of songbirds and other wildlife and provides a more attractive environment. Capability subclass VIIs.

103—Houghton muck. This nearly level, very poorly drained soil is in closed depressions and broad drainageways. Areas are rounded or oval and range from 10 to 200 acres in size.

Typically this soil contains several layers of black, decomposed organic material. These layers have a total thickness of 65 inches. The lower layers contain dark brown, partially decomposed plant fibers. The underlying mineral material is at a depth of more than 60 inches. In some areas free carbonates are at or near the surface, and in places there is a thinner dark colored surface layer that contains less organic matter.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton soils and poorly drained Drummer soils. These soils are on slight rises and in drainageways and make up 10 to 15 percent of the map unit.

Water and air move through this soil at a rapid rate, and surface runoff from cultivated areas is very slow. Reaction in all layers is neutral. Reaction in the surface layer varies with local liming practices but is commonly neutral. Natural fertility is low or medium, and organic-matter content is very high. Although the surface layer is friable, tillage is best accomplished over a limited range of moisture content. This soil blows easily when the surface layer is too dry, and areas of cropland are not accessible to farm equipment when the surface layer is too wet.

Most areas of this soil are used for row crops or for nursery or sod farms. One large area in the eastern part of the county is mined. This soil has poor potential for growing row crops and very poor potential for most urban uses.

This soil is suited to corn and soybeans if adequate drainage is provided. Drainage problems are difficult to solve because suitable outlets may not be available. Tile lines are difficult to install and maintain because of the relatively unstable organic material. Surface ditches are used in some areas, but unless the water table is controlled, wind erosion and subsidence will result. Special fertilizers are needed to produce good yields.

This soil is very poorly suited to most urban uses. Depth to the water table is frequently less than 1 foot. This soil is subject to frequent flooding. It has low strength and stability because organic-matter content and frost heave potential are high. Water moves downward through the soil at a rapid rate.

Alternative sites should be selected for urban development when possible. This soil lacks the strength and stability to support foundations for dwellings. Pilings placed below the organic material help to correct this. Frequent water saturation and flooding are also problems, and they may be difficult or expensive to correct. This soil is poorly suited to streets and roads because of low strength and stability, wetness, and flooding. It should not be used for sanitary facilities because of wetness, flooding, and seepage. Pollution of ground water supplies is a hazard when this soil is used for sanitary facilities.

This soil is not suited to most recreation uses. Wetness, the main problem, is difficult to correct. This soil provides a good habitat for wetland wildlife, and some areas can be developed for hunting. Capability subclass IIIw.

104—Virgil silt loam. This level or nearly level, somewhat poorly drained soil is in upland drainageways, in shallow depressions, and on broad, low-lying ridges. Areas are irregular in shape and range from 4 to 160 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is grayish brown silt loam about 5 inches thick. The subsoil is about 41 inches thick. The upper part is brown to dark brown, mottled silty clay loam; the middle part is brown and grayish brown, mottled silty clay loam; and the lower part is grayish brown mottled, silty clay loam and clay loam. The underlying material, to a depth of 60 inches, is light gray and light brownish gray, mottled, calcareous, stratified silt loam and fine sandy loam outwash. In some areas the surface layer is lighter in color, and in some areas it is thicker and darker. In places stratified outwash is closer to the surface than typical and the subsoil is thinner. In some areas in the southern part of the county, the underlying material is calcareous loam till.

Included with this soil in mapping are small areas of well drained and moderately well drained St. Charles soils on upland ridges and knolls and poorly drained Drummer soils in depressions and drainageways. These soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate to moderately slow rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. Available water capacity is high. The surface layer is friable and can be easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay and pasture, and trees and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. In places wetness is a concern when this soil is used for cultivated crops. Where wetness is a limitation, tile drains and shallow surface ditches are beneficial. Returning crop residue and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. Depth to the seasonal water table is 1 to 3 feet. This soil lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate to moderately slow rate.

This soil is moderately suited to dwellings without basements because of wetness and the lack of sufficient stability in the subsoil. Wetness can be reduced by installing tile drains. Stability can be improved by strengthening or replacing the base material. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a problem for constructing local streets and roads but can be minimized by strengthening or replacing subgrade material.

Use of this soil for conventional septic tank absorption fields is limited by wetness and moderately slow permeability. Adding fill material and constructing subsurface drainage systems improve suitability. Where permeability is a problem, increasing the size of the absorption field is advised. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a problem but can be overcome by sealing the bottom of the lagoon.

The soil is moderately suited to most recreation uses. Wetness is the main problem and may be overcome through the use of tile drains or shallow surface ditches. Trees, shrubs, and other vegetation reduce dust. Capability class I.

105A—Batavia silt loam, 0 to 2 percent slopes. This nearly level, well drained and moderately well drained soil is on knolls and broad, flat ridgetops on outwash plains. Areas are oval and range from 5 to 160 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is dark grayish brown silt loam about 3 inches thick. The subsoil is about 44 inches thick. The upper part is brown to dark brown and dark yellowish brown silty clay loam; the middle part is yellowish brown, mottled silty clay loam; and the lower part is brown and yellowish brown, mottled clay loam and silt loam that contains strata of fine sandy loam. The underlying material, to a depth of 60 inches, is brown and yellowish brown stratified silt loam and sandy loam outwash. In places the surface layer is thicker and darker or thinner and lighter in color. In some areas stratified outwash material is closer to the surface, and the subsoil is thinner. In some areas thin layers of coarse sand and gravel are in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 2 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is neutral to medium acid. Natural fertility is high, and organic-matter content is moderate. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed, but some areas are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats, and it is well suited to grasses and legumes grown for hay and pasture. The soil has no major limitations for growing cultivated crops. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility. Conservation tillage is recommended for controlling wind erosion.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. This problem can be corrected by strengthening foundations, replacing the base material, and placing footings below the frost line. This soil is well suited to dwellings with basements. Frost heave is a concern when building streets and roads, but problems can be avoided by replacing subgrade material. This soil is well suited to septic tank absorption fields.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. This soil has no limitations for such uses as playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

105B—Batavia silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on knolls and upland ridges of outwash plains. Areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is dark yellowish brown silty clay loam, the middle part is yellowish brown silty clay loam, and the lower part is pale brown clay loam. The underlying material, to a depth of 60 inches, is stratified yellowish brown and pale brown silt loam and sandy loam. In places the surface layer is thicker and darker or thinner and lighter in color. In some areas stratified outwash is closer to the surface and the subsoil is thinner. Sand and gravel are in the underlying material in places.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral to medium acid. Natural fertility is high, and organic-matter content is moderate. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for cultivated crops. Minimum tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material and putting footings below the frost line. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing subgrade material. This soil is well suited to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand intensive foot traffic. This soil has no limitations for the construction and use of camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before this soil can be made suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

125—Selma loam. This nearly level, poorly drained soil is on upland flats and in drainageways on outwash plains. Areas are irregular or long and narrow and range from 10 to 200 acres in size.

Typically, the surface layer is black loam about 13 inches thick. The subsoil is about 32 inches thick. The upper part is olive gray loam; the middle part is olive gray, mottled clay loam; and the lower part is olive gray, mottled sandy loam. The underlying material, to a depth of about 60 inches, is olive gray stratified silt loam and sandy loam. In some areas the soil is calcareous at or near the surface. In places there is less sand in the surface layer and subsoil, and in some areas coarse sand and gravel are in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton soils and well drained Martinsville soils. These soils are on slight rises and make up less than 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. The surface layer is commonly mildly alkaline. Reaction in the subsoil is neutral and mildly alkaline. Natural fertility is high, and organic-matter content is very high. The surface layer is friable but becomes compact and cloddy if tilled when too wet.

Most areas of this soil are farmed. The potential is good for crops and poor for urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main concern when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage. If the soil is plowed in fall and left bare, wind erosion may occur during spring and winter. Winter cover crops and minimum tillage reduce erosion. Returning crop residue and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. The water table is frequently at a depth of less than 1 foot. This soil is subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

Areas of this soil that are used for urban development must be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of difficulty in lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave. In places the installation of drainage systems and use of fill material make the soil more suitable. Because of wetness and flooding, conventional septic tank absorption fields should not be constructed. Sanitary facilities should be connected to commercial sewers and treatment plants. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage. Flood protection and sealing the bottoms of lagoons make it more suitable. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness, the main problem, can be overcome by using tile drains and surface ditches. Proper placement of trees, shrubs, and other vegetation helps to control erosion. Capability subclass IIw.

134A—Camden silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained and well drained soil is on broad ridgetops and knolls on outwash plains. Areas of this unit are irregular in shape and range from 3 to 110 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark grayish brown silt loam about 2 inches thick. The subsoil is about 50 inches thick. The upper part is brown to dark brown silty clay loam; the middle part is brown to dark brown silty clay loam and clay loam; and the lower part is mottled, brown clay loam. The underlying material, to a depth of 70 inches, is calcareous, stratified, yellowish brown sandy loam and silt loam. In places the surface layer is darker. In some areas depth to the underlying stratified loamy outwash is greater or the underlying material is gravelly sand.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral to strongly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content; however, it has a tendency to crust or puddle after hard rains.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. No major soil limitations restrict the growing of cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase the rate of water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward through this soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material and by placing foundation footings below frost level. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing subgrade material. This soil is well suited to septic tank absorption systems.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. No limitations restrict the construction and use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

134B—Camden silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on convex ridgetops, knolls, and short, uneven side slopes of outwash plains. Areas are irregular in shape and range from 3 to 160 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 39 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is brown silty clay loam, and clay loam, and the lower part is yellowish brown silt loam. The underlying material, to a depth of 60 inches, is calcareous, stratified, yellowish brown silt loam and loamy sand. In places the surface layer is thicker and darker. In some areas depth to the underlying stratified silt loam and loamy sand outwash is greater and the subsoil is thicker. In places the surface layer and subsoil contain more sand or the underlying material contains gravelly sand.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil ranges from neutral to strongly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it has a tendency to crust or puddle after hard rains.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is used for growing cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase the rate of water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward through this soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. This problem can be corrected by strengthening or replacing the base material and putting foundation footings below frost level. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing subgrade material. This soil is well suited to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. No limitations restrict the use of this soil for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before the area is suited to playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather and generally improves the attractiveness of the recreation areas. Capability subclass IIe.

134C2—Camden silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained and well drained soil is on short, uneven side slopes, convex ridges, and knolls of outwash plains. Areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 40 inches thick. The upper part is brown silty clay loam, the middle part is brown silty clay loam and clay loam, and the lower part is brown silt loam. The underlying material, to a depth of 60 inches, is calcareous, stratified, brown silt loam and fine sandy loam. In places the surface layer is thicker and darker. Also, in some places depth to the underlying stratified outwash is greater and the subsoil is thicker. In other areas the surface layer and subsoil contain more sand or the underlying material is gravelly sand. In some small areas where the upper part of the subsoil has been mixed with the surface layer by tillage, the surface soil is brown silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is rapid. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil ranges from neutral to strongly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content; however, it has a tendency to crust or puddle after hard rains, especially in areas where the plow layer contains subsoil material.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good to fair for crops and most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for growing cultivated crops. Poor tilth is also a limitation. Conservation tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. This problem can be corrected by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be minimized by replacing subgrade material. Some grading may also be necessary. This soil is well suited to septic tank absorption fields.

This soil is suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. Few limitations restrict the construction and use of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before this soil can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

145A—Saybrook silt loam, 0 to 2 percent slopes. This nearly level, well drained and moderately well drained soil is on broad ridgetops and knolls on ground moraines. Areas are irregular in shape and range from 10 to 260 acres in size.

Typically, the surface layer is very dark gray silt loam about 11 inches thick. The subsoil is about 25 inches thick. The upper part is brown to dark brown silty clay loam and the lower part is brown to dark brown and yellowish brown clay loam. The underlying material, to a depth of 60 inches, is yellowish brown calcareous loam. In places the subsoil is thicker and depth to calcareous loam till is greater. In some areas the lower part of the subsoil and underlying material contain stratified sandy loam and silt loam outwash. Also, in places in the western part of the county, the surface layer is thinner than typical.

Included with this soil in mapping are small areas of somewhat poorly drained Lisbon soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow or medium. Reaction ranges from neutral to medium acid in the subsoil and from neutral to slightly acid in the surface layer, depending on local liming practices. Natural fertility, organic-matter content, and available water capacity are high. The surface layer is friable and easily tilled through a fairly wide range of moisture content.

Most areas of this soil are farmed. The potential is very good for cultivated crops, hay, pasture, and trees and good to fair for most urban uses.

This soil is well suited to corn, soybeans, and small grain, and it is well suited to grasses and legumes grown for hay and pasture. Conservation tillage, winter cover crops, and grassed waterways help keep soil loss at a minimum. Returning crop residue or the regular addition of other organic material helps maintain fertility and increase water intake.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be minimized by replacing subgrade material. This soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil is a concern in places, but problems can be avoided by increasing the size of the absorption field.

This soil is well suited to recreational uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. No limitations restrict the use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

145B—Saybrook silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on convex ridges, knolls, and short, uneven side slopes in areas of ground moraines. Mapped areas are irregular in shape and range from 5 to 160 acres in size.

Typically, the surface layer is black silt loam about 13 inches thick. The subsoil is about 28 inches thick. The upper part is brown to dark brown silt loam and silty clay loam, the middle part is brown to dark brown clay loam, and the lower part is yellowish brown loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown loam till. In places the surface layer is thinner and lighter in color. In some areas the underlying calcareous loam till is deeper than typical and the subsoil is thicker. In some places the underlying material contains stratified sandy loam and silt loam outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Lisbon soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral or slightly acid. The subsoil ranges from mildly alkaline to medium acid. Natural fertility, available water capacity, and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and good to fair for most urban uses. This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is used for growing cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase the rate of water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided, however, by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be minimized by replacing subgrade material. Some grading may also be necessary. This soil is well suited to septic tank absorption fields. In places the rate of water movement in the subsoil is a concern, but problems can be avoided by increasing the size of the absorption field.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. No limitations restrict the use of this soil for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required, however, before the area is suited to playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

145C2—Saybrook silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained and well drained soil is on sides of ridges and on knolls and convex ridgetops. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsoil is about 21 inches thick. The upper part is brown to dark brown silty clay loam; and the lower part is dark brown and reddish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, reddish brown loam till. In places the surface layer is thinner and lighter in color and the upper part of the subsoil has been mixed with it through tillage. Also, in some areas depth to the calcareous underlying material is greater and the subsoil is thicker. The underlying material contains some stratified sandy loam and silt loam outwash in places.

Included with this soil in mapping are small areas of somewhat poorly drained Lisbon soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil ranges from neutral to medium acid. Natural fertility, organic-matter content, and available water capacity are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to good for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard where this soil is used for growing cultivated crops. Such practices as conservation tillage, terracing, contouring, and using grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be minimized by replacing subgrade material. Some grading may also be necessary. This soil is well suited to installation of septic tank absorption fields. The rate of water movement in the subsoil may be a concern, but problems can be avoided by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. Few limitations restrict construction and use of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before these areas can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

146—Elliott silt loam. This nearly level, somewhat poorly drained soil is in upland drainageways, in shallow depressions, and on broad, low-lying ridges of end moraines. Areas are irregular in shape and range from 5 to 120 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 12 inches thick. The subsoil is about 23 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is mottled, brown to dark brown silty clay loam; and the lower part is mottled, olive brown and light olive brown silty clay loam. The underlying material, to a depth of 60 inches, is mottled, light olive brown, calcareous silty clay loam. In places the surface layer is thinner and lighter in color. In some areas calcareous silt loam is in the underlying material.

Included with this soil in mapping are small areas of well drained Varna soils and poorly drained Milford soils. Varna soils are on upland ridges, and Milford soils are in depressions. These soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderately slow rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil ranges from slightly acid to mildly alkaline. Natural fertility and organic-matter content are high. The surface layer is friable, but it becomes cloddy if tilled when wet.

Most areas of this soil are farmed. The potential is fair for crops and poor to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness may be a concern when the soil is used for cultivated crops. Where wetness is a limitation, tile drains and shallow surface ditches can be used to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for some urban uses. Depth to the seasonal water table is 1 to 3 feet. This soil lacks sufficient stability because of the high frost heave potential. Water moves through the soil at a moderately slow rate.

This soil is poorly suited to dwellings because of wetness. The water table can be lowered by installing tile drains. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements than it is for dwellings without basements. Frost heave is a concern when constructing streets and roads but can be minimized by replacing subgrade material. Use of this soil for septic tank absorption fields is limited by wetness and slow percolation in the subsoil and underlying material. Adding fill material, increasing the size of absorption fields, and constructing subsurface drainage systems improve its suitability. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. This soil is well suited to sewage lagoons.

This soil is moderately suited to most recreation uses. Wetness, the main problem, can be overcome through the use of tile drains or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust. Capability subclass IIw.

148A—Proctor silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained and well drained soil is on broad, flat ridgetops and knolls on outwash plains. Areas are irregular or long and narrow and range from 5 to 200 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 13 inches thick. The subsoil is about 35 inches thick. The upper part is brown to dark brown silty clay loam, and the lower part is dark yellowish brown silty clay loam and loam. The underlying material, to a depth of 60 inches, is yellowish brown stratified, calcareous loam and silt loam outwash. In places the surface layer is thinner and lighter in color. In some areas depth to the underlying material is greater and the subsoil is thicker, and in other places calcareous loam till is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices but it is commonly slightly acid. The subsoil is slightly acid or neutral. Natural fertility and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content. Available water capacity is high.

Most areas of this soil are farmed, but some areas are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. No limitations restrict the use of this soil for cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. The soil is moderately suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be minimized by replacing subgrade material. This soil is well suited to septic tank absorption fields.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. No limitations restrict the use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

148B—Proctor silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on upland ridges and knolls and uneven side slopes on outwash plains. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 11 inches thick. The subsoil is about 42 inches thick. The upper part is dark yellowish brown silty clay loam, the middle part is yellowish brown silty clay loam and clay loam, and the lower part is brown to dark brown loam. The underlying material, to a depth of 60 inches, is stratified, yellowish brown loamy sand and sand. In places the surface layer is thinner and lighter in color. In some areas the subsoil is thicker and depth to the underlying stratified loamy outwash is greater. In some areas calcareous loam till is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of this map unit.

Water and air move though this soil at a moderate rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is medium acid to neutral. Available water capacity, natural fertility, and organic-matter content are all high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is fair to good.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for growing cultivated crops. Minimum tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but can be minimized by replacing the subgrade material. Some grading may also be necessary. This soil is well suited to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. No limitations restrict the use of this soil for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required to make it suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

149—Brenton silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on upland drainageways, in shallow depressions, and on broad, low-lying ridges on outwash plains. Areas are irregular or oval and range from 4 to 150 acres.

Typically, the surface layer is black and very dark grayish brown silt loam about 17 inches thick. The subsoil is about 28 inches thick. The upper part is mottled, brown to dark brown silty clay loam; and the lower part is mottled, grayish brown loam. The underlying material, to a depth of 60 inches, is stratified, calcareous, mottled, light olive brown sandy loam and loam outwash. In some places the surface layer is thinner and lighter in color. In some areas depth to the loam and sandy loam outwash material is greater and the subsoil is thicker. In other areas calcareous loam till is in the underlying material.

Included with this soil in mapping are small areas of well drained and moderately well drained Proctor soils on slight rises and poorly drained Drummer soils in depressions and drainageways. These soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is slightly acid or neutral. Natural fertility and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. In places wetness is a problem when the soil is used for cultivated crops. Where wetness is a limitation, tile drains and shallow surface ditches can be used to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. Depth to the seasonal water table is 1 to 3 feet. This soil lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability in the subsoil. The water table can be lowered by installing tile drains, and stability can be improved by strengthening foundations or replacing the base material. It is more difficult, however, to lower the water table enough for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by strengthening or replacing subgrade material and by improving surface drainage. Use of this soil for conventional septic tank absorption fields is severely limited by wetness. Adding fill material and constructing subsurface drainage systems improve suitability for septic tank systems, but, where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a concern, but problems can be avoided by sealing the bottoms of lagoons.

This soil is moderately well suited to most recreation uses. Wetness, the main concern, can be overcome by using tile drains or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust and improves the environment for recreational activities. Capability class I.

152—Drummer silty clay loam. This level or nearly level, poorly drained soil is on upland flats, in drainageways, and in depressions on outwash plains and on end and ground moraines. Areas are irregular in shape and range from 3 to 1,000 acres in size.

Typically, the surface layer is black silty clay loam about 13 inches thick. The subsoil is about 37 inches thick. The upper part is mottled, very dark gray and dark gray silty clay loam; the middle part is mottled, grayish brown silty clay loam; and the lower part is mottled, gray sandy loam. The underlying material, to a depth of 70 inches, is mottled, gray and grayish brown sandy loam and loam. In places free carbonates are in the surface layer and subsoil. In some areas there is a silt loam subsurface layer 6 to 10 inches thick. In places more sand and gravel is in the lower part of the subsoil and underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton, Flanagan, and Elburn soils. These soils are on upland ridges and knolls and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to ponded. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is neutral or slightly acid. Natural fertility is high, and organic-matter content is very high. The surface layer is friable but becomes compact and cloddy if tilled when wet.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is very good for crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main concern when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage (fig. 9). If the soil is plowed in the fall and left bare, wind erosion may occur during winter and spring. Winter cover crops and conservation tillage reduce erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the seasonal water table is less than 1 foot. This soil is subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

Areas of this soil used for urban development must be artificially drained and protected from flooding. Dwellings with basements may be expensive to construct because of the difficulty in lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave. Installation of drainage systems or use of fill material makes this soil more suitable for streets and roads. Because of wetness and flooding, conventional septic tank absorption fields should not be constructed. All sanitary facilities need to be connected to commercial sewers. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage hazard. Flood protection and sealing the bottoms of lagoons make it more suitable. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main concern, but can be reduced through the use of tile drains and surface ditches. Proper placement of trees, shrubs, and other vegetation helps control erosion. Capability subclass IIw.

154—Flanagan silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on upland flats and slight rises on ground moraines. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is black silt loam about 15 inches thick. The subsoil is about 32 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is mottled, grayish brown silty clay loam; and the lower part is light brownish gray silty clay loam and loam. The underlying material, to a depth of 60 inches, is light brown, brown, and strong brown calcareous loam till. In places calcareous loam is closer to the surface and the subsoil is thinner. In some areas stratified, loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of moderately well drained Catlin soils and poorly drained Drummer soils. Catlin soils are in the more sloping areas, and Drummer soils are in drainageways. These soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium to slow. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral. Natural fertility and organic-matter content are high. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. In places wetness is a concern when this soil is used for cultivated crops. Where wetness is a limitation, tile drains and shallow surface ditches can be installed to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for some urban uses. Depth to the seasonal water table is 1 to 3 feet. This soil lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is poorly suited to dwellings because of wetness and lack of sufficient strength and stability in the subsoil. The water table can be lowered by installing tile drains. Strength and stability can be improved by replacing base material. It is more difficult to lower the water table enough for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads. Problems can be minimized by replacing subgrade material. Use of this soil for septic tank absorption fields is limited by wetness. It can be improved by adding fill material, increasing the size of the absorption field, and constructing subsurface drains. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. This soil is suited to sewage lagoons, but commonly requires sealing and compaction of lagoon floors to prevent seepage.

This soil is only moderately suited to most recreation uses. Wetness is the main concern, but can be overcome through the use of tile drains or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust. Capability class I.

171A—Catlin silt loam, 0 to 2 percent slopes. This nearly level, well drained and moderately well drained soil is on broad upland ridgetops and knolls on ground moraines. Areas are irregular in shape and range from 10 to 180 acres in size.

Typically, the surface layer is black and very dark grayish brown silt loam about 13 inches thick. The subsoil is about 42 inches thick. The upper part is brown to dark brown and yellowish brown silty clay loam, and the lower part is brown to dark brown and very dark grayish brown clay loam. The underlying material, to a depth of 70 inches, is yellowish brown and light yellowish brown, calcareous loam till. In places the underlying material is stratified sandy loam and silt loam. In some areas calcareous loam till is closer to the surface and the subsoil is thinner. Some areas in the southern part of the county have a thinner surface layer than typical.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium to slow. Reaction in the surface layer varies with local liming practices, but it is commonly slightly acid. The subsoil is medium acid to neutral. Natural fertility and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content. Available water capacity is high.

Most areas of this soil are farmed, but some areas are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No major limitations restrict the growing of cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve natural fertility.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and in the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 4 feet.

Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings with or without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. Frost heave is a concern when designing streets and roads but can be minimized by replacing subgrade material. This soil is moderately suited to septic tank absorption fields. The rate of water movement in the subsoil is a concern in places, but problems can be avoided by increasing the size of the absorption field.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. No limitations restrict the use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

171B—Catlin silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on convex ridgetops, knolls, and short, uneven side slopes on ground moraines. Areas are oval or long and narrow and range from 5 to 120 acres in size.

Typically, the surface layer is very dark gray and very dark grayish brown silt loam about 13 inches thick. The subsoil is about 43 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is dark yellowish brown and yellowish brown silty clay loam, and the lower part is brown to dark brown clay loam and loam. The underlying material, to a depth of 70 inches, is calcareous, yellowish brown and light brown loam till. In places the subsoil is thinner and calcareous loam is closer to the surface. In some areas the surface layer is thinner and lighter in color, and in some areas stratified sandy loam and silt loam outwash are in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil ranges from neutral to medium acid. Natural fertility and organic-matter content are high. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. Potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve natural fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings with or without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. Frost heave is a concern when maintaining streets and roads but can be minimized by replacing subgrade material. This soil is moderately suited to septic tank absorption fields. The rate of water movement in the subsoil is a concern in places, but problems can be avoided by increasing the size of the absorption field.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface layer that can withstand heavy foot traffic. No limitations restrict the use of this soil for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required to make this soil suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

194B—Morley silt loam, 2 to 5 percent slopes. This gently sloping, well drained and moderately well drained soil is on convex ridgetops, side slopes, and knolls. Areas of this unit are irregular in shape and range from 10 to 120 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 6 inches thick. The subsoil is about 33 inches thick. The upper part is brown to dark brown silty clay loam and silty clay, and the lower part is mottled, yellowish brown silty clay loam. The underlying material, to a depth of 60 inches, is mottled, light yellowish brown silty clay loam. In places the surface layer is thicker and darker. In some areas stratified loamy outwash is in the lower part of the subsoil and in the underlying material. Sand and gravel are in the underlying material in places.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. These soils are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderately slow or slow rate, and surface runoff from cultivated areas is medium or rapid. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil ranges from mildly alkaline to medium acid. Natural fertility is medium and organic-matter content is low. Available water capacity is high. The surface layer is friable, but it is sticky when wet and hard and cloddy when dry. Moisture conditions are best for cultivation when the soil is neither saturated nor excessively dry. In places root development is somewhat restricted in the underlying material by the compact silty clay loam till.

Some areas of this soil are farmed; however, most areas in the eastern part of the county are used for urban development. Potential is good for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard when this soil is used for cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is suited to many urban uses if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 3 feet. Water moves downward through the soil at a moderately slow to slow rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is only moderately suited to dwellings with basements because of seasonal wetness. Problems can be avoided by installing subsurface drains. Frost heave and shrink-swell potential are concerns when constructing streets and roads but can be minimized by replacing subgrade material. The moderately slow to slow rate of water movement in the subsoil and underlying material is a concern when installing septic tank absorption fields. Problems can be avoided by increasing the size of the absorption field and by adding more porous soil. This soil is only moderately suited to sewage lagoons because of slope. Some grading may be necessary.

This soil is suited to recreation uses. Few limitations restricc the use of this soil for picnic sites, footpaths, trails, and bridle paths. The moderately slow to slow permeability limits the use of the soil for camp areas and playgrounds. Tile drainage may be needed to prevent water from ponding. Proper placement of trees, shrubs, and other vegetation reduces dust, controls soil loss, and improves the general aesthetic value of the area. Capability subclass IIe.

194C—Morley silt loam, 5 to 10 percent slopes. This moderately sloping, moderately well drained and well drained soil is on sides of ridges, on knolls, and on convex ridgetops of end moraines. Areas are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 30 inches thick. The upper part is brown to dark brown heavy silty clay loam; and the lower part is mottled, yellowish brown silty clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown silty clay loam till. In places the surface layer is thicker and darker or the underlying material contains stratified loamy outwash. Sand and gravel are in the underlying material in places.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderately slow or slow rate, and surface runoff from cultivated areas is rapid. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is slightly acid or neutral. Natural fertility is medium, and organic-matter content is low. Available water capacity is high. The surface layer is friable, but it is sticky when wet and hard and cloddy when dry. Crusting or puddling occurs in some areas after hard rains, especially areas where the plow layer contains subsoil material. Root development is somewhat restricted in the underlying material by the compact silty clay loam till.

Most areas of this soil are used either for urban land or woodland, but some areas are farmed. The potential is good for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is used for cultivated crops. Also, poor tilth is a limitation. Minimum tillage, terracing, contouring, and grassed waterways help to reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. Such erosion control practices as terracing and contouring are impractical in some areas because of short, uneven slopes.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 3 feet. Water moves downward through the soil at a moderately slow or slow rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. Also, this soil is only moderately suited to dwellings with basements because of seasonal wetness, which can be countered by installing subsurface drainage systems. Frost heave and shrink-swell potential are concerns when constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. The moderately slow or slow rate of water movement in the subsoil and underlying material limits the use of septic tank absorption fields. Increasing the size of the absorption field and adding more porous soil material are helpful practices. Suitability for sewage lagoons is limited by slope.

This soil is suited to recreation uses. It has few limitations for picnic areas, footpaths, trails, and bridle paths. The moderately slow to slow movement of water through this soil limits its use for camp areas and playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust and soil loss. Capability subclass IIIe.

194D—Morley silt loam, 10 to 15 percent slopes. This strongly sloping, moderately well drained and well drained soil is on side slopes, knolls, and convex ridges. Areas of this unit are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsurface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 26 inches thick. The upper part is brown to dark brown silty clay loam, and the lower part is yellowish brown silty clay loam that contains dolomitic cobbles and pebbles. The underlying material, to a depth of 60 inches, is yellowish brown, calcareous silty clay loam till. In places sand and gravel are in the underlying material. Much of the surface layer is eroded in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. These soils are in shallow depressions and drainageways. They make up less than 10 percent of the map unit. Also included are areas of Urban land.

Water and air move through this soil at a moderately slow or slow rate, and surface runoff from cultivated areas is rapid. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is neutral to medium acid. Natural fertility is medium, and organic-matter content is low. Available water capacity is high. The surface layer is friable, but it is sticky when wet and hard and cloddy when dry. The ideal moisture condition for cultivation is when the soil is neither saturated with water nor excessively dry. Crusting or puddling occurs in some areas after hard rains, especially where the plow layer contains subsoil material. Root development is somewhat restricted in the underlying material by the compact silty clay loam till.

Most areas of this soil are in timber or pasture, but some areas in the eastern part of the county are used for urban development. The potential is poor for crops and fair to poor for most urban uses.

This soil is suited to grasses and legumes grown for hay and pasture; however, if proper management practices are used to control erosion, corn and soybeans can be grown in the cropping system. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, grassed waterways, and conservation tillage reduce soil erosion. Short, uneven slopes limit terracing and contouring in some areas.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 5 feet. Water moves downward through the soil at a moderately slow or slow rate. Measures to control erosion are necessary on construction sites.

This soil is only moderately suited to dwellings with or without basements because of the lack of sufficient stability in the subsoil and because of slope. Problems can be avoided by strengthening or replacing the base material and by leveling. Frost heave and shrink-swell potential are concerns when constructing streets and roads but can be minimized by replacing the subgrade material. Grading may also be required. This soil is poorly suited to septic tank absorption fields. The rate of water movement in the subsoil and the degree of slope are the main problems. Special design is needed to provide a septic system that will function properly. This soil is not suited to sewage lagoons because of excessive slope.

This soil is suited to some recreation uses. Few limitations restrict the use of this soil for footpaths, trails, and bridle paths. Moderately slow to slow permeability and strong slopes limit its use for camp and picnic areas. Leveling is required to make this soil suitable for picnic areas. Leveling and the addition of fill material are needed when constructing camp areas. Playgrounds are not recommended on this soil. Proper placement of trees, shrubs, and other vegetation slows surface runoff and curtails erosion. This soil is well suited to winter sports. Capability subclass IVe.

194E—Morley silt loam, 15 to 20 percent slopes. This moderately steep, moderately well drained and well drained soil is on narrow ridges and side slopes on end moraines. Areas are long and narrow and irregular in shape and range from 5 to 25 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper part is yellowish brown silty clay loam, the middle part is brown to dark brown silty clay, and the lower part is reddish brown silty clay loam that contains dolomitic pebbles and cobbles. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown silty clay loam. In places sand and gravel are in the underlying material. In some areas much of the surface layer has become eroded.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. They are in drainageways and make up less than 10 percent of the unit.

Water and air move through this soil at a moderately slow or slow rate, and surface runoff from cultivated areas is very rapid. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil ranges from medium acid to neutral. Natural fertility is medium, and organic-matter content is low.

Available water capacity is high. The surface layer is friable, but it is sticky when wet and hard and cloddy when dry. In some areas crusting or puddling occurs after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are in timber or pasture, but some areas are used for urban development.

Because of the slope and a severe erosion hazard, this soil is not suited to intensive use for such row crops as corn and soybeans. Careful management is needed to control erosion and maintain fertility and good tilth. This soil is best suited to grasses and legumes grown for hay and pasture. Use of such conservation practices as terracing and contouring are restricted in some areas by irregular relief.

This soil is poorly suited to urban development because of excessive slope. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 5 feet. Water moves downward through the soil at a moderately slow or slow rate.

Alternative sites should be selected for urban development when possible, and the areas should be planted to trees, shrubs, and other ornamentals to minimize erosion. Erosion needs to be controlled, especially in areas adjacent to less sloping soils that are under development. Construction on areas of this soil, although not advised, requires special engineering design to overcome slope limitations.

This soil is not suited to most recreation uses. Its use for paths and trails is moderately limited by excessive slope, and its use for camp and picnic areas is severely limited. Extensive leveling is required to make this soil suitable for camp or picnic areas. Playgrounds should not be constructed. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Areas of this soil are well suited to winter sports. Capability subclass IVe.

198—Elburn silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is in upland drainageways and shallow depressions and on broad, low-lying ridges on outwash plains. Areas are irregular in shape and range from 4 to 400 acres in size.

Typically, the surface layer is black and very dark grayish brown silt loam about 12 inches thick. The subsoil is about 36 inches thick. The upper part is mottled, brown to dark grayish brown silty clay loam; the middle part is mottled, grayish brown silty clay loam, and the lower part is mottled, light yellowish brown loam. The underlying material, to a depth of 60 inches, is olive gray and light yellowish brown to yellowish brown, stratified silt loam and sandy loam outwash. In some areas the surface layer is thinner and lighter in color, and in places stratified outwash is closer to the surface and the subsoil is thinner. In the southern part of the county, calcareous loam till is in the underlying material. Gravelly outwash is in the underlying material in some areas adjacent to streams.

Included with this soil in mapping are small areas of well drained and moderately well drained Plano soils on upland ridges and poorly drained Drummer soils in drainageways and depressions. They make up less than 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is mildly alkaline to slightly acid. Available water capacity, natural fertility, and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range in moisture content.

Most areas of this soil are farmed, but some areas are used for urban development. The potential is very good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is a concern when this soil is used for cultivated crops, but tile drains and shallow surface ditches can be installed to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil is suited to many urban uses if proper design and installation procedures are used. Depth to the seasonal water table is 1 to 3 feet. This soil lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability in the subsoil. The water table can be lowered by installing tile drains. Stability can be improved by strengthening or replacing the base material. It is more difficult to lower the water table for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by strengthening or replacing subgrade material. Use of this soil for conventional septic tank absorption fields is limited by wetness. Adding fill material or constructing subsurface drains improves suitability. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a problem but can be overcome by sealing the bottom of the lagoon.

This soil is moderately suited to most recreation uses. Wetness is the main concern and can be minimized by using tile drains or shallow surface ditches. The use of trees, shrubs, and grasses reduces dust, improves trafficability, and increases esthetic value. Capability class I.

199A—Plano silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained and well drained soil is on broad ridgetops on outwash plains. Areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 12 inches thick. The subsoil is about 48 inches thick. The upper part is brown to dark brown and yellowish brown silty clay loam, the middle part is yellowish brown silty clay loam, and the lower part is yellowish brown clay loam. The underlying material, to a depth of 70 inches, is calcareous, brown, stratified loamy sand and silt loam outwash. In places the surface layer is thinner and lighter in color. In some areas the subsoil is thinner and calcareous outwash is closer to the surface. In places in the southern part of the county, the underlying material contains calcareous loam.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from medium acid to neutral. Natural fertility is high, and organic-matter content is high. The surface layer is friable and easily tilled over a relatively wide range in moisture content. Available water capacity is high.

Most areas of this soil are farmed. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. No limitations restrict the use of this soil for cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening and replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by replacing subgrade material. This soil is well suited to the installation of septic tank absorption fields.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface layer that can withstand intensive foot traffic. No limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

199B—Plano silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on broad ridgetops and knolls. Areas are irregular in shape and range from 10 to 150 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 15 inches thick. The subsoil is about 43 inches thick. The upper part is brown to dark brown silt loam, the middle part is dark yellowish brown and yellowish brown silty clay loam, and the lower part is dark yellowish brown sandy clay loam and sandy loam. The underlying material, to a depth of 70 inches, is calcareous, brown loamy sand outwash. In places the surface layer is thinner and lighter in color. In some areas the subsoil is thinner, and calcareous sandy and silty outwash is closer to the surface. In the southern part of the county, the underlying material contains calcareous loam till in some places.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is slow to medium. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from medium acid to neutral. Natural fertility is high, and organic-matter content is high. The surface layer is friable and easily tilled over a relatively wide range in moisture content. Available water capacity is high.

Most areas of this soil are farmed. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard where this soil is used for cultivated crops. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by replacing subgrade material. This soil is well suited to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. No limitations restrict the use of this soil for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before this soil can be made suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather and helps to control soil loss. Capability subclass IIe.

206—Thorp silt loam. This level, poorly drained soil is in depressions on outwash plains. Areas are rounded and range from 3 to 20 acres in size.

Typically, the surface layer is very dark gray silt loam about 12 inches thick. The subsurface layer is grayish brown and light brownish gray silt loam about 8 inches thick. The subsoil is about 43 inches thick. The upper part is mottled, gray silty clay loam; the middle part is mottled, grayish brown silty clay loam; and the lower part is mottled, gray silty clay loam and clay loam. The underlying material, to a depth of 70 inches, is calcareous, dark grayish brown, mottled sandy loam outwash. In some places the surface layer is silty clay loam that is thicker and darker, and there is no subsurface layer.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils on slight rises. These included soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a slow rate, and surface runoff from cultivated areas is slow to ponded. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is neutral. Natural fertility, organic-matter content, and available water capacity are high. The surface layer is friable, but it becomes compact and cloddy if it is tilled when too wet.

Most areas of this soil are farmed. The potential is poor to fair for crops and poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is the main concern when this soil is used for cultivated crops. Tile drains and surface ditches improve drainage. Wind erosion sometimes occurs during spring and winter if this soil has been plowed in the fall and left bare. Winter cover crops or conservation tillage reduce erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. Depth to the water table is frequently less than 1 foot. This soil is also subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a slow rate.

Areas of this soil that are used for urban development must be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of the difficulty in lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for streets and roads is limited by wetness, flooding, and frost-heave potential. The installation of drainage systems and use of fill material may make it more suitable. Because of wetness, flooding, and slow permeability, conventional septic-tank absorption fields should not be constructed. Instead, sanitary facilities should be connected to commercial sewers and treatment plants. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage. Flood protection and sealing the bottoms of lagoons make it more suitable. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main concern, but can be overcome by using tile drains and surface ditches. This soil is subject to wind erosion. Proper placement of trees, shrubs, and other vegetation helps control erosion. Capability subclass IIw.

210—Lena muck. This nearly level, very poorly drained soil is in closed depressions and drainageways. Areas are rounded and range from 5 to 125 acres in size.

Typically, this soil contains several layers, or tiers, of black sapric material that have a total thickness of more than 60 inches. The middle and lower tiers are dark reddish brown when rubbed between the fingers. Free carbonates are throughout the profile. The underlying sediments are commonly silt loam, sandy loam, or silty clay loam. In some areas the surface layer is thinner, darker colored, and contains less organic matter. Also, in some areas free carbonates are not at or near the surface.

Included with this soil in mapping are small areas of poorly drained Canisteo soils and somewhat poorly drained Kane soils. They are on slight rises and in drainageways. These included soils make up 10 to 15 percent of the unit.

Water and air move through this soil at a moderately slow to moderately rapid rate. Reaction is mildly alkaline and moderately alkaline. Natural fertility is high, and organic-matter content is very high. The available water capacity is very high. The potential for frost action is high. The seasonal high water table is within 1 foot of the surface during the winter and spring.

This soil is suited to corn and soybeans if adequate drainage is provided. Drainage problems are difficult to solve because suitable outlets may not be available. Tile drains are difficult to install and maintain because of the relatively unstable organic material. Surface ditches are beneficial in some areas, but unless the water table is controlled, wind erosion and subsidence will result. Special fertilizers are needed for optimum production.

This soil is very poorly suited to most urban uses. Depth to the water table is frequently less than 1 foot. This soil is subject to frequent flooding. It has low strength and stability because of the very high organic-matter content and high frost heave potential. Water moves downward through the soil at a moderately rapid rate.

Alternative sites should be selected for urban development when possible. Because this soil lacks the strength and stability to support foundations for dwellings, pilings should be placed below the organic material. Frequent water saturation and flooding are also problems that may be difficult or expensive to correct. This soil is poorly suited to streets and roads because of low strength and stability, wetness, and flooding. Sanitary facilities should not be placed on this soil because of wetness, flooding hazard, and seepage. Pollution of ground water supplies is a hazard when this soil is used for sanitary facilities.

This soil is not suited to most recreation uses. Wetness is the main concern, and problems are difficult to overcome. This soil supports good wetland wildlife habitat, and some areas can be developed for hunting. Capability subclass IIIw.

219—Millbrook silt loam. This nearly level, somewhat poorly drained soil is on upland flats and slight rises near drainageways on outwash plains. Areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is grayish brown silt loam about 4 inches thick. The subsoil is about 31 inches thick. The upper part is mottled, grayish brown silty clay loam, the middle part is brown silty clay loam, and the lower part is light olive brown sandy clay loam and sandy loam. The underlying material, to a depth of 60 inches, is stratified light olive brown sandy loam and loamy sand outwash. In places the surface layer is thicker and darker. In some areas the outwash is deeper and the subsoil is thicker. In some areas in the southwestern part of the county, calcareous till is in the underlying material.

Included with this soil in mapping are small areas of well drained and moderately well drained Harvard and Camden soils. These soils are on ridges above Millbrook soils and poorly drained Drummer soils. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. Reaction in surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid to medium acid. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a wide range in moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness is a concern when the soil is cultivated, but tile drains and shallow surface ditches can be used to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. It is seasonally saturated 1 to 3 feet below the surface. This soil lacks sufficient stability because it has high frost-heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and the instability in the subsoil. The water table can be lowered by installing tile drains. Stability can be improved by strengthening or replacing the base material. It is more difficult, however, to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by strengthening or replacing subgrade material.

Use of this soil for conventional septic tank absorption fields is limited by wetness. Adding fill material and constructing subsurface drainage systems improve suitability for septic tanks. Wherever possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a concern, but problems can be avoided by sealing the bottom of the lagoon.

The soil is only moderately suited to most recreation uses. Wetness is the main concern, but can be overcome by using tile drains or shallow surface ditches. Proper placement of trees, shrubs, and other vegetation reduces dust. Capability class I.

223B—Varna silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops, knolls, and uneven sides of end moraines. Areas are irregular in shape and range from 10 to 160 acres in size.

Typically, the surface layer is very dark gray silt loam about 11 inches thick. The subsoil is about 26 inches thick. The upper part is dark brown silty clay loam; the middle part is mottled, brown to dark brown and dark yellowish brown silty clay loam; and the lower part is yellowish brown silty clay loam. The underlying material, to a depth of 60 inches, is calcareous, mottled, yellowish brown silty clay loam till. In places the surface layer is thinner and lighter in color. In some areas stratified sandy loam and silt loam outwash is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Elliot soils and poorly drained Milford soils in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderately slow rate, and runoff from cultivated areas is medium. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from mildly alkaline to slightly acid. Natural fertility and organic-matter content are high. The surface layer is friable but becomes compact and cloddy if tilled when wet.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats, and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility, improve soil tilth, increase water infiltration, and reduce soil losses.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost-heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 4 feet. Water moves downward through the soil at a moderately slow rate.

This soil is only moderately suited to dwellings without basements because of the instability of the subsoil. Problems can be avoided, however, by strengthening or replacing the base material. Also, this soil is only moderately suited to dwellings with basements because of seasonal wetness. Installing subsurface drainage systems can be helpful. Frost heave is a concern when constructing streets and roads but can be minimized by replacing the subgrade material. This soil is poorly suited to septic tank absorption fields because of the moderately slow percolation rate. The severity of this problem can be reduced by enlarging the absorption field.

This soil is suited to recreation uses. Few limitations restrict its use for picnic areas, footpaths, trails, and bridle paths. The moderately slow permeability limits the use of this soil for camp areas and playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

223C2—Varna silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained and well drained soil is on side slopes, knolls, and convex ridges on end moraines. Areas are irregular in shape and range from 5 to 65 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 19 inches thick. It is brown to dark brown silty clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown silty clay loam. In places the surface layer is thinner and lighter in color and part of the subsoil has been mixed with it through tillage. Outwash of stratified sandy loam and silt loam is in the underlying material in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Elliott soils. They occupy shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderately slow rate, and runoff from cultivated areas is rapid. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral or slightly acid. Natural fertility and organic-matter content are high. The surface layer is friable, but it becomes compact and cloddy if tilled when too wet.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard where this soil is cultivated. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 5 feet. Water moves downward through the soil at a moderately slow rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but this condition can be corrected by strengthening or replacing the base material. This soil is only moderately suited to dwellings with basements because of seasonal wetness. Frost heave is a concern when constructing streets and roads but can be minimized by replacing the subgrade material. Some grading may also be necessary. The soil is poorly suited to septic tank absorption fields because of the slow percolation rate. Problems can be avoided by increasing the size of the absorption field.

This soil is suited to some recreation uses. Few limitations restrict its use for picnic areas, footpaths, trails, and bridle paths. The moderately slow permeability limits the use of this soil for campsites. Excessive runoff caused by compaction and moderately slow permeability may produce erosion. Leveling is needed before areas can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces erosion. Capability subclass IIIe.

233A—Birkbeck silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on upland flats and slight rises. Areas are oval or long and narrow and range from 4 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 46 inches thick. The upper part is dark yellowish brown silt loam, the middle part is dark yellowish brown and yellowish brown silty clay loam, and the lower part is mottled, brown and dark yellowish brown silty clay loam and clay loam. The underlying material, to a depth of 60 inches, is calcareous, mottled, brown loam till. In places the surface layer is darker. In some areas calcareous loam till is closer to the surface and the subsoil is thinner. In other places, stratified loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Sabina and Herbert soils and poorly drained Drummer soils. These soils occupy shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. The subsoil ranges from slightly acid to strongly acid. Reaction in the surface layer varies with local liming practices but is commonly neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. It has a tendency, however, to crust or become puddled after hard rains.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No major limitations restrict the use of this soil for cultivated crops. There is a tendency for crusts to form on the surface. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually at a depth of more than 3 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is only moderately suited to dwellings with basements because of wetness. Tiling and other techniques that lower the water table will solve the problem. Frost heave is a concern when constructing streets and roads but can be countered by replacing the subgrade material. This soil is well suited to septic tank absorption fields. In places the rate of water movement in the subsoil is a concern, but problems can be avoided by enlarging the absorption field. Where wetness is a problem, subsurface drainage systems can be installed.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam soil texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

233B—Birkbeck silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on ridges and short, uneven sides of ground moraines. Areas are oval and range from 4 to 150 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is dark yellowish brown and yellowish brown silty clay loam, and the lower part is mottled, brown and yellowish brown loam. The underlying material, to a depth of 60 inches, is calcareous, brown loam till. In some areas the surface layer is thicker and darker. In places calcareous loam till is closer to the surface and the subsoil is thinner. In other places stratified loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Sabina and Herbert soils and poorly drained Drummer soils. These included soils occupy shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from neutral to strongly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. This soil has a tendency to crust and become puddled after hard rains.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard in cultivated areas. Conservation tillage and winter cover crops help to control erosion. A few slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 3 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. The soil is only moderately suited to dwellings with basements because of wetness. Tiling and other means of lowering the water table will solve this problem. Frost heave is a concern when constructing streets and roads but can be improved by replacing the subgrade material. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil may be a problem but can be corrected by enlarging the absorption field. Where wetness is a problem, subsurface drainage systems can be installed.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide a firm surface, which is required for heavy foot traffic. No soil limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

233C2—Birkbeck silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained soil is on ridges and uneven side slopes on ground moraines. Areas are irregular in shape and range from 10 to 60 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 36 inches thick. The upper part is dark yellowish brown silty clay loam; the middle part is mottled, dark yellowish brown silty clay loam; and the lower part is mottled, yellowish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown loam till. In places the surface layer is thicker and darker, or where it has been mixed with the subsoil by tillage, it is brown silty clay loam. In some areas calcareous loam till is closer to the surface and the subsoil is thinner. In other places stratified loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Sabina and Herbert soils and poorly drained Drummer soils. These included soils occupy shallow depressions and drainageways. They make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate and runoff from cultivated areas is rapid. Available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from neutral to strongly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. This soil has a tendency to crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed. The potential for crops is good to fair, and the potential for most urban uses is also good to fair.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Poor tilth is also a limitation. The surface crusts easily. The surface layer becomes cloddy if plowed when too wet. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks stability in the subsoil, but problems can be avoided by strengthening or replacing the base material. This soil is only moderately suited to dwellings with basements because of shrink-swell potential and wetness. Frost heave is a problem when constructing streets and roads, but conditions can be improved by replacing the subgrade material. Some grading may also be necessary. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil is a problem in places, but this can be corrected by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and silt loam soil texture provide a firm surface, which is required for heavy foot traffic. Few limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed to make the surface suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation controls wind and water erosion. Capability subclass IIIe.

236—Sabina silt loam. This nearly level, somewhat poorly drained soil is on broad flats and knolls near drainageways on till plains. Areas are irregular in shape and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is grayish brown silt loam about 4 inches thick. The subsoil is about 44 inches thick. The upper part is mottled, olive brown silty clay loam; the middle part is mottled, grayish brown and dark grayish brown silty clay loam; and the lower part is mottled, light olive brown silty clay loam and clay loam. The underlying material, to a depth of 60 inches, is calcareous, mottled, yellowish brown loam till. In places the surface layer is thicker and darker. In other areas the underlying loam till is closer to the surface and the subsoil is thinner. In still other areas stratified outwash is in the underlying material.

Included with this soil in mapping are small areas of moderately well drained Birkbeck soils on slight rises and poorly drained Drummer soils in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderately slow rate, and runoff from cultivated areas is medium to slow. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral to medium acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. It has a tendency to crust or become puddled, however, after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops is good, and the potential for most urban uses is fair to poor.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. In places wetness is a concern when the soil is cultivated. Where wetness is a limitation, tile drains and shallow surface ditches improve drainage. In places a crust forms on the surface. Adding animal manure and returning crop residue to the soil help to maintain organic-matter content and improve soil tilth and fertility.

This soil can be made suitable for some urban uses. It is seasonally saturated 1 to 3 feet below the surface. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderately slow rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability and strength in the subsoil. The water table can be lowered by installing tile, and stability and strength can be improved by replacing or strengthening base material. Use of this soil for dwellings with basements is limited by wetness. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads, but conditions can be improved by replacing the subgrade material. Use of this soil for conventional septic tank absorption fields is limited by wetness and the slow percolation in the subsoil and underlying material. Adding fill material, enlarging the absorption field, and constructing subsurface drainage systems are ways to improve suitability for septic tank absorption fields. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. This soil is well suited to sewage lagoons.

This soil is only moderately suited to most recreation uses. Wetness is the main concern, but problems can be overcome by using tile drains or digging shallow surface ditches. Proper placement of trees, shrubs, and other vegetation reduces dust. Capability subclass IIw.

243A—St. Charles silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained and well drained soil is on broad ridgetops on outwash plains. Areas are long and broad and range from 5 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 4 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 52 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is yellowish brown sandy clay loam. The underlying material, to a depth of 70 inches, is stratified sandy loam and silt loam outwash. In places the surface layer is thicker and darker. The underlying material is closer to the surface in some places, and the subsoil is thinner. In some areas calcareous sand and gravel are in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is slow. Available water capacity is high. The subsoil is strongly acid. Reaction in the surface layer varies with local liming practices but is commonly neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. In places it has a tendency to crust or become puddled, however, after hard rains, especially where the plow layer contains material from the subsoil.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No major limitations restrict the use of this soil for cultivated crops. There is a tendency for crust to form on the surface. This tendency can be reduced by conservation tillage. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce erosion.

This soil is suited to urban development if proper design and installation procedures are used. It lacks stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally at a depth of more than 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material or placing footings below frost level. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing the subgrade material. The soil is well suited to septic-tank absorption fields.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam soil texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

243B—St. Charles silt loam, 2 to 5 percent slopes. This gently sloping, well drained and moderately well drained soil is on broad ridgetops and side slopes on outwash plains. Areas are oval and range from 10 to 90 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 57 inches thick. The upper part is brown to dark brown and dark yellowish brown silty clay loam, and the lower part is mixed brown to dark brown and yellowish brown sandy clay loam and sandy loam. The underlying material, to a depth of 70 inches, is stratified yellowish brown and dark yellowish brown sand and loamy sand outwash. In places sandy outwash is closer to the surface or the surface layer is thick and darker. In some areas the underlying material is calcareous sand and gravel. Some areas in the southwestern part of the county have calcareous loam till in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. Reaction varies in the surface layer as a result of local liming practices, but is commonly neutral. The subsoil is slightly acid to strongly acid. Natural fertility is medium, and the organic-matter content is low. The surface layer is friable and easily tilled over a fairly wide range of moisture content. It does, however, have a tendency to crust or become puddled after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed. This soil has good potential for cultivated crops, hay, pasture, and trees. Potential for most urban uses is fair to good.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage and winter cover crops help to control erosion. In a few areas slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally at a depth of more than 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by replacing the subgrade material. This soil is well suited to installation of septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and silt loam soil texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before an area can be made suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

290A—Warsaw loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, upland ridgetops. Areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is very dark gray and grayish brown loam about 12 inches thick. The subsoil is about 18 inches thick. The upper part is dark brown clay loam, the middle part is dark yellowish brown and brown to dark brown clay loam, and the lower part is brown to dark brown loamy sand. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In places the surface is thinner and lighter in color. In some areas the underlying sand and gravel is deeper in the profile, and the subsoil is thicker. In places the underlying material contains stratified sandy loam and silt loam outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Selma and Will soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate in the upper layers and at a very rapid rate in the underlying material. Runoff from cultivated areas is slow. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from neutral to slightly acid. Natural fertility is high, and organic-matter content is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops and most urban uses is good.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. Providing an adequate amount of water is the main concern when this soil is cultivated. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be avoided by replacing the subgrade material. It is well suited to septic tank absorption fields. A potential for pollution of ground water exists because of the rapidly permeable underlying material. This soil is unsuited to sewage lagoons because of the seepage hazard in the underlying material.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and loam texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIs.

290B—Warsaw loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on upland ridgetops and knolls. Areas are irregular in shape and range from 10 to 30 acres in size.

Typically, the surface layer is very dark gray and very dark grayish brown loam about 11 inches thick. The subsoil is about 21 inches thick. The upper part is dark yellowish brown clay loam, the middle part is brown to dark brown clay loam, and the lower part is brown to dark brown sandy clay loam. The underlying material, to a depth of 60 inches, is calcareous brown gravelly sand. In places the surface layer is thinner and lighter in color. In places the subsoil is thinner and the underlying calcareous sand and gravel are closer to the surface.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in shallow depressions and drainageways. These included soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a very rapid rate in the underlying material. Runoff from cultivated areas is medium. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is neutral or slightly acid. Natural fertility and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas are used for urban development. The potential for crops and most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Some areas may be droughty in dry years. Conservation tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a very rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be avoided by replacing the subgrade material. This soil is well suited to septic-tank absorption fields. Potential for pollution of ground water exists because of the rapidly permeable underlying material. The soil is unsuited to sewage lagoons because of the seepage hazard in the underlying material.

This soil is well suited to most recreation uses. Good drainage and loam texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before an area can be made suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

298—Beecher silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on flats and drainageways on end moraines. Areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 24 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is mottled, olive brown silty clay and light olive brown silty clay loam; and the lower part is light olive brown silty clay loam. The underlying material, to a depth of 60 inches, is calcareous, mottled, light yellowish brown silty clay loam till. In places the surface layer is thicker and darker. In some areas stratified loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of well drained and moderately well drained Morley and Markham soils on slight rises and poorly drained Milford soils in shallow depressions and drainageways. These soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a slow rate, and runoff from cultivated areas is slow to medium. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops is good, and the potential for most urban uses is fair to poor.

This soil is suited to corn, soybeans, oats, and wheat. It is also suited to grasses and legumes grown for hay and pasture. In places wetness is a problem when the soil is cultivated. Where wetness is a limitation, shallow surface ditches can be installed to improve drainage. Tile drains function poorly because of the slow water movement. Adding animal manure and returning crop residue to the soil help to maintain organic-matter content and fertility and improve soil tilth.

This soil can be made suitable for some urban uses. It is seasonally saturated at a depth of 1 to 3 feet. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through this soil at a slow rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability and strength in the subsoil. The water table can be lowered by installing tile drains, and strength and stability can be improved by replacing the base material. Use of this soil for dwellings with basements is limited by wetness. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads, but problems can be avoided by replacing the subgrade material. Use of this soil for septic tank absorption fields is limited by wetness and the slow permeability in the subsoil and underlying material. Adding fill material, increasing the size of the absorption field, and constructing subsurface drainage systems with large backfilled trenches will improve suitability for septic tanks. Where possible, sanitary facilities should be connected to commercial sewers and treatment plants. This soil is well suited to sewage lagoons.

This soil is only moderately suited to most recreation uses. Wetness is the main concern but can be minimized by drainage through shallow surface ditches. Proper placement of trees, shrubs, and other vegetation reduces dust and makes the area more attractive. Capability subclass IIw.

318A—Lorenzo loam, 0 to 2 percent slopes. This nearly level, well drained soil is on outwash ridges and knolls. Areas are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is very dark brown and very dark grayish brown loam about 13 inches thick. The subsoil is about 8 inches thick. It is brown to dark brown loam. The underlying material, to a depth of 60 inches, is brown, calcareous gravelly sand. In places the subsoil is thicker and is deeper to gravel. In some areas the surface layer is thinner and lighter colored.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will and Selma soils in shallow depressions and drainageways. These included soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderately rapid rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is slow. Available water capacity is low. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is mildly alkaline or neutral. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops is fair, and the potential for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. This soil tends to be droughty in dry years and droughty late in summer most years. Depth to gravel and low available water capacity limit the use of this soil for crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth, maintain or increase organic-matter content, and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderately rapid rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements and to streets and roads. It is well suited to installation of septic tank absorption fields, but there is a potential for pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and loam texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIs.

318B—Lorenzo loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on outwash ridges and knolls. Areas are irregular in shape and range from 3 to 140 acres in size.

Typically, the surface layer is very dark grayish brown loam about 12 inches thick. The subsoil is about 8 inches thick. It is brown to dark brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown and light gray gravelly sand. In places the surface layer and subsoil are thicker and depth to sand and gravel is greater. In other places the surface layer is thinner and lighter in color.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and poorly drained Will soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderately rapid rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is medium. Available water capacity is low. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas are used for urban development. The potential for crops is fair, and the potential for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. This soil is droughty in dry years and droughty late in summer most years. Erosion control and maintaining soil moisture are the main concerns if the soil is cultivated. Minimum tillage and winter cover crops help to control erosion. In a few areas slopes are long enough and smooth enough for contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderately rapid rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements and well suited to streets and roads. It is well suited to installation of septic tank absorption systems, but there is potential pollution of ground water because of the rapidly permeable underlying material. This soil is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to most recreation uses. Good drainage and loam soil texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIIs.

318C2—Lorenzo clay loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on convex ridgetops, side slopes, and knolls. Areas are oblong and range from 3 to 35 acres in size.

Typically, the surface layer is dark brown clay loam about 6 inches thick. The subsoil is about 10 inches thick. It is dark brown gravelly clay loam. The underlying material, to a depth of 60 inches, is calcareous yellowish brown and dark brown gravelly sand. In places the subsoil is thicker and it is deeper to sand and gravel. In other places the surface layer is thinner and lighter in color and sand and gravel are exposed at the surface.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in shallow drainageways. These included soils make up less than 10 percent of the unit.

Water and air move through this soil at a moderately rapid rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is medium. Available water capacity is low. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas are used for urban development. The potential for crops is fair, and the potential for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. It is droughty in dry years. Erosion control and maintaining soil moisture are the main concerns if the soil is cultivated. Minimum tillage, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. Irregular topography, short, uneven slopes, and gravel near the surface limit terracing.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderately rapid rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements and to streets and roads. It is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in underlying material.

This soil is suited to most recreation uses. There are few limitations for camp areas, picnic areas, trails, footpaths, and bridle paths in these areas. Leveling is needed for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IVe.

323D—Casco loam, 10 to 15 percent slopes. This strongly sloping, well drained soil is on upland ridgetops, side slopes, and knolls. Areas are round or irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is brown to dark brown loam about 8 inches thick. The subsoil is about 13 inches thick. The upper part is brown to dark brown clay loam, and the lower part is brown to dark brown sandy clay loam. The underlying material, to a depth of 60 inches, is brown gravelly sand. In places the surface layer is darker or has been mixed with the subsoil during tillage and contains more sand and gravel. In some areas gravelly sand is closer to the surface and the subsoil is thinner. The underlying material in some areas is calcareous loam till.

Included with this soil in mapping are small areas of poorly drained Will soils. They occupy shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through the surface layer and subsoil at a moderate rate and through the underlying material at a very rapid rate. Runoff from cultivated areas is rapid. Available water capacity is low. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral or slightly acid. Natural fertility is low, and organic-matter content is low. The surface layer is friable, but in places it is difficult to till because of cobbles at or near the surface. It has a tendency to crust or become puddled after hard rains.

Most areas of this soil are in pasture and woodland, although some areas are used for urban development. The potential for crops is fair or poor, and the potential for most urban uses is fair.

This soil is suited to grasses and legumes grown for hay and pasture. It is suited to crops if proper management practices are used to control erosion. Corn and soybeans, for example, can be grown in a cropping system that effectively controls erosion. Yields are likely to be low, however, because of low fertility and low available water for plant growth. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Contouring, grassed waterways, and conservation tillage reduce soil erosion. Terracing is not recommended because of shallow soil depth. A cropping system in which more small grains are grown than corn and soybeans functions best.

This soil is suited to urban development if proper design and installation procedures are used. The water table is at a depth of more than 6 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a very rapid rate.

This soil is only moderately suited to dwellings with and without basements because of excessive slope. Slope and shrink-swell potential are concerns when constructing streets and roads. Problems can be avoided by using the underlying material for the subgrade and by grading the slopes. The soil is only moderately suited to septic tank absorption fields because of excessive slope. Special design of the absorption field is needed to compensate for the excessive slopes. Also, there is potential pollution of ground water because of the rapidly permeable underlying material. The soil is unsuited to sewage lagoons because of the seepage hazard in the underlying material. Care must be taken in selecting sites for waste disposal on this soil.

This soil is suited to some recreation uses. Few limitations restrict the use of this soil for footpaths, trails, and bridle paths. Leveling is needed prior to the construction of campsites and picnic areas and extensive leveling is needed prior to the construction of playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control erosion. Capability subclass VIe.

323E—Casco loam, 15 to 20 percent slopes. This moderately steep, well drained soil is on upland ridges and side slopes. Areas are rounded or irregular in shape and range from 5 to 50 acres in size (fig. 10).

Typically, the surface layer is brown to dark brown loam about 7 inches thick. The subsoil is about 11 inches thick. It is dark yellowish brown clay loam. The underlying material, to a depth of 60 inches, is yellowish brown gravelly sand. In places the underlying gravelly sand is closer to the surface, and the subsoil is thinner. In some areas the underlying material is calcareous loam till.

Included with this soil in mapping are small areas of poorly drained Will soils in shallow depressions and drainageways. These included soils make up less than 10 percent of the unit.

Water and air move through the surface layer and subsoil at a moderate rate and through the underlying material at a very rapid rate. Runoff from cultivated areas is rapid. Available water capacity is low. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. Reaction in the subsoil is neutral. Natural fertility is low, and organic-matter content is low. The surface layer is friable, but it is difficult to till in places because of cobbles at or near the surface. Excessive slope restricts the use of farm machinery in places.

Most areas of this soil are in pasture and woodland. The potential for cultivated crops and most urban uses is poor.

This soil is not suited to intensive use for row crops such as corn and soybeans because of slope, severe erosion hazard, and droughtiness. Careful management is needed to control erosion and maintain fertility and good tilth. The soil is better suited to grasses and legumes grown for hay and pasture than it is to other uses. Terracing and contouring are limited in some areas by irregular topography and gravelly sand near the surface.

This soil is unsuited to most urban uses because of excessive slope. The water table is generally at a depth of more than 6 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a very rapid rate.

Alternative sites should be selected for urban development when possible, and trees, shrubs, and other ornamentals and grasses need to be planted to help in the control of erosion. This moderately steep soil, in areas adjacent to developments, is well suited to winter sports. Also, with proper cover, it attracts a variety of songbirds and other wildlife.

There is potential pollution of ground water supplies when this soil is used for sanitary facilities because the underlying material is very rapidly permeable.

This soil is not suited to most recreation uses. Excessive slope is a moderate limitation for paths and trails and a severe limitation for camp areas and picnic areas. Extensive leveling is needed for campsites or picnic areas, and playgrounds should not be constructed. Proper placement of trees, shrubs, and other vegetation helps to control erosion. Capability subclass VIe.

325A—Dresden silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on ridgetops and knolls. Areas are oval and range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 25 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is dark yellowish brown clay loam, and the lower part is dark yellowish brown and brown to dark brown sandy clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In places the surface layer is thinner and lighter in color or thicker and darker. The underlying material is deeper in some areas and the subsoil is thicker.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in depressions and drainageways. These included soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is slow. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is neutral to slightly acid. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops and most urban uses is good.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No major soil limitations restrict the use of this soil for cultivated crops. Maintaining adequate moisture is a concern in dry years. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of shrink-swell potential, but problems can be avoided by using the underlying material for subgrade. This soil is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide the firm surface required for intensive foot traffic. No soil limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather and makes the site more attractive for recreation uses. Capability subclass IIs.

325B—Dresden silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridgetops and knolls. Areas are irregular in shape and range from 10 to 250 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 31 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is brown to dark brown gravelly clay loam. The underlying material, to a depth of 60 inches, is calcareous, dark yellowish brown gravelly sand. In places the surface layer is thinner and lighter in color or thicker and darker. In places the underlying material is deeper and the subsoil is thicker.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in shallow depressions and drainageways. These included soils make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is slow to medium. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is slightly acid. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable, and it is easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops and most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain content of organic matter, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of shrink-swell potential, but problems can be avoided by replacing the subgrade material. It is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. In places some leveling is required prior to the construction of playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

325C—Dresden silt loam, 5 to 10 percent slopes. This moderately sloping, well drained soil is on side slopes and knolls. Areas are long and narrow and range from 5 to 160 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is-about 25 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is brown to dark brown sandy clay loam and gravelly clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown and pale brown gravelly sand. In some areas, the surface layer is thinner and lighter in color or has been mixed with the upper part of the subsoil during tillage. In places the underlying material is deeper in the profile and the subsoil is thicker.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and poorly drained Will soils in shallow depressions and drainageways. These included soils make up 0 to 10 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid. Natural fertility is medium, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content. In places, however, the surface has a tendency to crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops and for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain content of organic matter, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be avoided by using the underlying material for subgrade construction. This soil is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is suited to most recreation uses. Good drainage and silt loam soil texture provide the firm surface required for heavy foot traffic. Few limitations exist for campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed prior to the construction of playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

327A—Fox silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on ridgetops and broad plains on uplands. Areas are irregular in shape and range from 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 25 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is strong brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In places the surface is thicker and darker. In some areas the underlying gravelly sand is deeper in the profile and the subsoil is thicker.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and Millbrook soils and poorly drained Will and Drummer soils in shallow depressions and drainageways. These included soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is slow to medium. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. In places the surface tends to crust or puddle, however, after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops and most urban uses is good.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. Providing adequate soil moisture in dry years is the main concern when this soil is cultivated. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be avoided by using the underlying material for subgrade construction. This soil is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, campsites, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIs.

327B—Fox silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridgetops and knolls on uplands. Areas are irregular in shape and range from 4 to 75 acres in size.

Typically, the surface layer is dark gray silt loam about 6 inches thick. The subsurface layer is brown to dark brown silt loam about 4 inches thick. The subsoil is about 20 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is brown to dark brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In places the surface layer is thicker and darker. In some areas the underlying gravelly sand is closer to the surface and the subsoil is thinner. In places the underlying sand and gravel are deeper.

Included with this soil in mapping are small areas of somewhat poorly drained Kane and Millbrook soils and poorly drained Will and Drummer soils in shallow depressions and drainageways. These included soils make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is medium. Available water capacity is moderate. Reaction in the surface layer varies according to local liming practices but is commonly neutral. The subsoil is neutral to slightly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content. In places the surface has a tendency to crust or puddle after hard rains, however, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed. The potential for crops and most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion and droughtiness are the main hazards if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be avoided by using the underlying material as subgrade. This soil is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. In places some leveling is required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

327C—Fox silt loam, 5 to 10 percent slopes. This moderately sloping, well drained soil is on ridges, side slopes, and knolls on uplands. Areas are oval and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 25 inches thick. The upper part is dark yellowish brown and brown to dark brown silty clay loam, the middle part is brown to dark brown clay loam and sandy clay loam, and the lower part is brown to dark brown sandy loam. The underlying material, to a depth of 60 inches, is calcareous, brown gravelly sand. In places the surface layer is thicker and darker. In some areas the subsoil is thicker and the underlying calcareous sand and gravel are deeper, and in other places the subsoil is thinner than typical and the underlying gravelly sand is closer to the surface.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in shallow drainageways. These included soils make up less than 10 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is medium. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid or mildly alkaline. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. In places, however, the surface has a tendency to crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential for crops and most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to growing grasses and legumes for hay and pasture. Erosion and droughtiness are the main hazards if the soil is cultivated. The surface crusts easily. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. In some areas the soil is unsuited to terracing because of irregular topography and short slopes.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads because of the shrink-swell potential, but problems can be corrected by replacing the subgrade material. This soil is well suited to septic-tank absorption fields, but there is potential pollution of ground water because of the rapidly permeable underlying material. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. Few limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed prior to using it for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

327D—Fox silt loam, 10 to 15 percent slopes. This strongly sloping, well drained soil is on kamic ridges and side slopes. Areas are oblong and range from 5 to 25 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 18 inches thick. The upper part is brown to dark brown silty clay loam, and the lower part is strong brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown to dark brown gravelly sand. In places the surface layer and subsoil are thinner, and calcareous sand and gravel are closer to the surface. In some areas calcareous loam till is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and poorly drained Will soils in shallow drainageways. These included soils make up less than 5 percent of the unit.

Water and air move through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate. Runoff from cultivated areas is rapid. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil ranges from slightly acid to neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content. In places, however, the surface has a tendency to crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is fair for crops and most urban uses.

This soil is suited to grasses and legumes grown for hay and pasture. Some areas are droughty in dry years. Under proper management that controls erosion, corn and soybeans can be rotated in the cropping system. The erosion hazard is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, grassed waterways, and conservation tillage reduce soil loss. A cropping system in which more small grains are grown than corn and soybeans functions best. Some areas are unsuited to terracing because of the irregular topography and the short, uneven slopes.

This soil is suitable for urban development if proper design and installation procedures are used. The water table is at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is only moderately suited to dwellings with and without basements because of the somewhat excessive slope, but grading improves slope restrictions. Slope and shrink-swell potential are concerns when constructing streets and roads, but problems can be avoided by replacing subgrade material and grading slopes. This soil is only moderately suited to installation of septic-tank absorption fields because slope may restrict the size of the field. There is also potential pollution of ground water because of the rapidly permeable underlying material. This soil is not suited to sewage lagoons because of seepage in the underlying material.

This soil is suited to some recreation uses. Few limitations restrict the use of this soil for footpaths, trails, and bridle paths. Campsites and picnic areas require some leveling prior to construction, and playgounds require extensive leveling. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Capability subclass IVe.

329—Will silty clay loam. This level to nearly level, poorly drained soil is in drainageways. Areas are irregular in shape and range from 10 to 500 acres in size.

Typically, the surface layer is black silty clay loam about 11 inches thick. The subsoil is about 20 inches thick. The upper part is mottled, very dark gray clay loam; the middle part is mottled, olive gray clay loam; and the lower part is dark gray and grayish brown sandy loam. The underlying material, to a depth of 60 inches, is grayish brown, calcareous gravelly sand. In some areas stratified loamy outwash is in the lower part of the subsoil and in the underlying material. In some areas free carbonates are at or near the surface.

Included with this soil in mapping are small areas of somewhat poorly drained Kane soils and well drained Warsaw soils on slight rises, ridges, and knolls. These included soils make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material. Runoff from cultivated areas is slow to ponded. Available water capacity is moderate. Reaction in the surface layer is commonly neutral. The subsoil is neutral or mildly alkaline. Natural fertility is high, and organic-matter content is high. The surface layer is friable, but it becomes compact and cloddy if tilled when too wet.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is poor.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Wetness is the main concern when the soil is cultivated. Tile drains and surface ditches improve drainage. Where tile drains are installed, special filters are needed to prevent clogging by sand and gravel. If the soil is plowed in fall and left bare, wind erosion may occur during spring. Winter cover crops and conservation tillage reduce erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth, maintain or increase organic-matter content, and improve fertility.

This soil is poorly suited to most urban uses. It is seasonally saturated at a depth of less than 1 foot. This soil is subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through this soil at a moderate rate.

Areas of this soil that are used for development must be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of the problem of lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave potential. Installing drainage systems and using fill material makes this soil more suitable for streets and roads. Conventional septic-tank absorption fields should not be constructed because of wetness and flooding. All sanitary facilities should be connected to commercial sewers. Use of this soil for sewage lagoons is impractical because of the limitations caused by wetness, flooding, and seepage. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main concern, but problems can be avoided by using tile drains and surface ditches. The silty clay loam in the surface layer is slippery and sticky when wet, and it dries slowly.

Proper placement of trees, shrubs, and other vegetation helps to control erosion, increases trafficability, and makes the areas more attractive. Capability subclass IIw.

330—Peotone silty clay loam. This nearly level, very poorly drained soil is in depressional areas on uplands. Areas are oval and range from 3 to 60 acres in size.

Typically, the surface layer is black silty clay loam about 14 inches thick. The subsoil is about 39 inches thick. The upper part is black and very dark gray silty clay loam, the middle part is dark gray and olive gray silty clay loam, and the lower part is olive brown, olive gray, and gray silty clay loam. The underlying material, to a depth of 60 inches, is mixed gray and olive gray silty clay loam. In places the surface layer is thinner or a thick subsurface layer is 10 to 15 inches below the surface. Muck is in some places.

Included with this soil in mapping are small areas of somewhat poorly drained Brenton and Elburn soils on slight rises. These included soils make up 0 to 15 percent of the unit.

Water and air move through this soil at a moderately slow rate, and surface runoff from cultivated areas is ponded. Available water capacity is very high. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is neutral to slightly acid. Natural fertility is high, and organic-matter content is very high. The surface layer is friable, but it becomes compact and cloddy if it is tilled when too wet.

Most areas of this soil are farmed. The potential for crops is fair to good, and the potential for most urban uses is poor.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Wetness is the main concern when the soil is cultivated. Tile drains and surface ditches improve drainage, and they are generally required for cultivated crops. If the soil is plowed in fall and left bare, wind erosion may occur during spring and winter. Winter cover crops or conservation tillage reduces erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is poorly suited to most urban uses. It is frequently saturated less than 1 foot below the surface. Also, this soil is subject to frequent flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has high shrink-swell potential. Water moves downward through the soil at a moderately slow rate.

Areas of this soil used for urban development must be artificially drained and protected from flooding. Dwellings with or without basements may be difficult or expensive to construct because of difficulty in lowering the water table. Use of this soil for streets and roads is limited by wetness, flooding, shrink-swell potential, and frost heave potential. Installing drainage systems and using fill material help to make the soil more suitable for streets and roads. This soil has a severe limitation for septic tank absorption fields because of wetness and the moderately slow permeability. All sanitary facilities should be connected to commercial sewers and treatment plants. Onsite investigations are essential to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main concern, but can be minimized by using tile drains and surface ditches. Once drainage is established, the silty clay loam surface material is often sticky and slippery, and it dries slowly. This soil is subject to wind erosion. Proper placement of trees, shrubs, and other vegetation helps to control erosion. Capability subclass IIw.

343—Kane silt loam. This nearly level, somewhat poorly drained soil is on stream terraces and outwash plains. Areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is black silt loam and very dark gray loam about 11 inches thick. The subsoil is about 22 inches thick. The upper part is mottled, dark grayish brown clay loam, and the lower part is grayish brown and olive brown, mottled clay loam and sandy loam. The underlying material, to a depth of 60 inches, is mottled, grayish brown, calcareous gravelly sand. In places the underlying material is stratified loamy outwash. In some places the surface layer is thinner and lighter in color.

Included with this soil in mapping are small areas of poorly drained Will soils in drainageways and well drained Warsaw soils on slight rises. These soils make up 5 to 15 percent of the unit.

Water and air move through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate. Available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. Natural fertility and organic-matter content are high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops is good, and the potential for urban uses is fair to poor.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. In places wetness is a concern when the soil is cultivated. Where wetness is a limitation, tile drains and shallow surface ditches will improve drainage. Where tile drains are used, a special filter placed around the tile drain will prevent it from being clogged by sand and gravel. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. It is seasonally saturated 1 to 3 feet below the surface. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a rapid rate.

This soil is only moderately suited to dwellings without basements because of wetness and the lack of sufficient stability in the subsoil. The water table can be lowered by installing tile drains. Stability can be improved by strengthening or replacing the base material. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by strengthening or replacing subgrade material. Wetness limits the use of this soil for septic-tank absorption fields. Adding fill material and constructing subsurface drainage systems improve suitability for septic tank systems. There is potential pollution of ground water supplies because of the rapidly permeable underlying material. Where possible, sanitary facilities should be connected to commercial sewers or treatment plants. The suitability of this soil for sewage lagoons is limited by wetness and seepage in the underlying material.

This soil is moderately suited to most recreation uses. Wetness is the main concern, but it can be lessened by using tile drains or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust. Capability subclass IIs.

344A—Harvard silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained and well drained soil is on broad ridgetops on outwash plains. Areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish brown silty clay loam, the middle part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown, stratified fine sandy loam and silt loam. In places the surface layer is thinner and lighter in color or it is thicker and darker. Also, in some places the subsoil is thicker and stratified outwash is deeper. The underlying material contains sand and gravel in places.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook and Brenton soils and poorly drained Drummer soils. These included soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is slow. The available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is medium acid to neutral. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops and most urban uses is good.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No limitations restrict the use of this soil for cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally at a depth of more than 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads but can be minimized by replacing the subgrade material. The soil is well suited to installation of septic-tank absorption fields.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide the firm surface required for intensive foot traffic. No limitations restrict the use of this soil for playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capabilty class I.

344B—Harvard silt loam, 2 to 5 percent slopes. This gently sloping, moderately well to well drained soil is on short, uneven side slopes, convex ridgetops, and knolls on outwash plains. Areas are irregular in shape and range from 3 to 160 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 33 inches thick. The upper part is brown to dark brown silty clay loam; the middle part is mottled, yellowish brown silty clay loam; and the lower part is mottled, yellowish brown clay loam. The underlying material, to a depth of 60 inches, is stratified, calcareous, yellowish brown and light yellowish brown silt loam and sandy loam outwash. In places the surface layer is thinner and lighter in color, and in other places it is thicker and darker. In some areas the subsoil is thicker and stratified loamy outwash is deeper. In places the underlying material contains sand and gravel.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook and Brenton soils and poorly drained Drummer soils. These included soils are in shallow depressions and drainageways. They make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. The available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid or neutral. Natural fertility is high, and organic-matter content is medium. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage and winter cover crops help to control erosion. A few slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally at a depth of more than 4 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil. Problems can be avoided, however, by strengthening or replacing the base material. The soil is well suited to dwellings with basements. Frost heave is a concern for constructing streets and roads but can be minimized by replacing the subgrade material. This soil is well suited to septic-tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. No soil limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. In places leveling is required to make the area suitable for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

344C—Harvard silt loam, 5 to 10 percent slopes. This moderately sloping, moderately well drained to well drained soil is on short, uneven side slopes, convex ridges, and knolls on outwash plains. Areas are long and narrow and range from 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 33 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is yellowish brown silty clay loam, and the lower part is dark yellowish brown clay loam. The underlying material, to a depth of 60 inches, is stratified yellowish brown loamy sand and silt loam outwash. In places where the surface layer has been mixed with subsoil by tillage, it is thinner and lighter in color. In some areas the underlying material contains sand and gravel.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Drummer soils. These included soils are in shallow depressions and drainageways. They make up less than 10 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium to rapid. The available water capacity is moderate. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid or neutral. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is generally at a depth of more than 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but problems can be avoided by strengthening or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a concern when constructing streets and roads, but it can be minimized by replacing the subgrade material. Some grading may also be necessary. This soil is well suited to installation of septic-tank absorption fields.

This soil is suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. Few limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

347—Canisteo loam. This level or nearly level, poorly drained soil is on drainageways and in depressions on outwash plains. It is subject to occasional flooding. Areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is calcareous black loam about 11 inches thick. The subsoil is about 24 inches thick. The upper part is calcareous, very dark gray clay loam, and the lower part is calcareous, mottled, gray clay loam. The underlying material, to a depth of 60 inches, is calcareous, stratified, mottled, gray to light gray loam and gray silt loam. In places the surface layer and subsoil contain more silt and less sand. In some areas the underlying material contains gravelly sand; in other areas no free carbonates are in the surface layer and subsoil.

Included with this soil in mapping are small areas of somewhat poorly drained Mundelein and Brenton soils. They occupy slight rises and make up 0 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is slow. The surface layer and subsoil are moderately alkaline or mildly alkaline. Natural fertility is high, and organic-matter content is very high. The surface layer is friable, but it becomes compact and cloddy if tilled when too wet.

Most areas of this soil are farmed. The potential for crops is good, and the potential for most urban uses is poor.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Wetness is the main concern when the soil is cultivated. Tile drains and surface ditches improve drainage. If the soil is plowed in fall and left bare, wind erosion may occur during the winter and spring. Winter cover crops or conservation tillage help reduce erosion. Returning crop residue to the soil and adding animal manure help to maintain good tilth, maintain or increase organic-matter content, and improve fertility.

This soil is poorly suited to most urban uses. It is frequently saturated at a depth of less than 1 foot. It is also subject to occasional flooding. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential.

Areas of this soil used for urban development need to be artificially drained and protected from flooding. Dwellings with basements may be difficult or expensive to construct because of difficulty in lowering the water table. Dwellings without basements should be constructed only after drainage systems are installed. Use of this soil for streets and roads is limited by wetness, flooding, and frost heave potential. Installing drainage systems and using fill material makes this soil more suitable for streets and roads. Conventional septic-tank absorption fields should not be constructed because of wetness and flooding. All sanitary facilities should be connected to commercial sewers and treatment plants. Use of this soil for sewage lagoons is limited by wetness, flooding, and seepage. Protection from flooding and treatment to seal the bottom of the lagoon makes it more suitable. Onsite investigations are needed to properly evaluate and plan the development of specific sites.

This soil has severe limitations for most recreation uses. Wetness is the main concern, but problems can be avoided by using tile drains and surface ditches or landfill. Proper placement of trees, shrubs, and other vegetation helps control erosion. Capability subclass IIw.

361B—Kidder silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls on end moraines. Areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 31 inches thick. The upper part is brown to dark brown clay loam, and the lower part is light yellowish brown sandy loam. The underlying material, to a depth of 60 inches, is calcareous, light yellowish brown sandy loam till. In places the underlying material is gravelly loam or it is calcareous loam till. Also, in some areas the underlying material contains stratified, loamy outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a moderately rapid rate through the underlying material. Runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil ranges from medium acid to moderately alkaline. Available water capacity is moderate. Natural fertility and organic-matter content are low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. It has a tendency to crust or puddle, however, after hard rains.

Most areas of this soil are in woodland or pasture, although some areas in the eastern part of the county are used for urban development. The potential for crops is fair, and the potential for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage and winter cover crops help to control erosion. In some areas the soil tends to be droughty, especially in dry years. A few slopes are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a moderately rapid rate.

This soil is well suited to dwellings with basements. It is only moderately suited to dwellings without basements and to streets and roads because of shrink-swell potential. Problems can be avoided by replacing or strengthening the subgrade material. This soil is well suited to septic tank absorption fields. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is well suited to most recreation uses. Good drainage and silt loam soil texture provide the firm surface required for heavy foot traffic. No limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

361C—Kidder silt loam, 5 to 10 percent slopes. This moderately sloping, well drained soil is on convex ridgetops, knolls, and short, uneven side slopes on end moraines. Areas are irregular in shape and range from 5 to 70 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown silty clay loam, the middle part is brown to dark brown clay loam, and the lower part is yellowish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown sandy loam till. In places the underlying material is gravelly loam and in other places it is calcareous loam till; in other areas cultivation has caused much of the surface layer to become eroded.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. These included soils are in shallow depressions and drainageways. They make up 5 to 10 percent of the map unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a moderately rapid rate through the underlying material. Runoff from cultivated areas is rapid. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is mildly alkaline to medium acid. Natural fertility and organic-matter content are low. Available water capacity is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content. It has a tendency to crust or puddle, however, after hard rains.

Most areas of this soil are used for urban development, although some areas in the eastern part of the county are used for woodland or pasture. The potential for crops is fair, and the potential for most urban uses is good.

This soil is suited to corn, soybeans, wheat, and oats. It is also suited to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. In some areas the soil tends to be droughty, especially in dry years. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is generally at a depth of more than 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a moderately rapid rate.

This soil is well suited to dwellings with basements. It is only moderately suited to dwellings without basements and to streets and roads because of shrink-swell potential. Problems can be avoided, however, by replacing or strengthening the subgrade material. This soil is well suited to septic-tank absorption fields. It is unsuited to sewage lagoons because of seepage in the underlying material.

This soil is suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. Few limitations restrict the use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

361D—Kidder silt loam, 10 to 15 percent slopes. This strongly sloping, well drained soil is on uneven side slopes and ridges on end moraines. Areas are oval and range from 5 to 40 acres in size.

Typically, the surface layer is dark brown silt loam about 4 inches thick. The subsurface layer is brown to dark brown loam about 4 inches thick. The subsoil is about 24 inches thick. The upper part is brown to dark brown sandy clay loam, the middle part is dark brown and strong brown sandy clay loam, and the lower part is brown to dark brown sandy loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown sandy loam till. In places the underlying material is gravelly sand, and in other places it is calcareous loam till. In places the surface layer is loam and clay because it has been mixed with subsoil by tillage. In some areas slopes are stronger.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils in shallow depressions and drainageways. These included soils make up less than 10 percent of the unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a moderately rapid rate through the underlying material. Runoff from cultivated areas is rapid. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral or mildly alkaline. Natural fertility is low, and organic-matter content is low. Available water capacity is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content. This soil has a tendency to crust or puddle, however, after hard rains, especially where the plow layer contains subsoil material.

Most areas are in woodland and pasture, although some areas in the eastern part of the county are used for urban development. The potential for crops is fair to poor, and the potential for most urban uses is fair.

This soil is suited to grasses and legumes grown for hay and pasture. Under proper management that controls erosion, corn and soybeans can be rotated in the cropping system. Yields are likely to be low, however, because of low fertility and moderate available water capacity. The hazard of erosion is severe. Careful management is needed to control erosion and maintain fertility and good tilth. Contouring, grassed waterways, and conservation tillage reduce soil erosion. Terracing is not recommended because of the short, irregular slopes. A cropping system that includes more small grains than corn and soybeans functions best on this soil.

This soil is suitable for urban development if proper design and installation procedures are used. The water table is at a depth of more than 6 feet. Water moves downward through the surface layer and subsoil at a moderate rate and through the underlying material at a moderately rapid rate.

This soil in only moderately suited to dwellings with and without basements because of slope, and some leveling is needed in places. Slope and shrink-swell potential are concerns when constructing streets and roads. Problems can be avoided by replacing subgrade material and grading slopes. This soil is only moderately suited to septic tank absorption fields because of slope, which, in places, restricts the size of the absorption field. In places grading helps to correct this problem. The soil is unsuited to sewage lagoons because of seepage in the underlying material and steepness.

This soil is suited to some recreation uses. Few limitations restrict the use of this soil for footpaths, trails, and bridle paths. Campsites and picnic areas require some leveling before construction is begun, and areas to be used for playgrounds require extensive leveling. This soil is well suited as a site for winter sports. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Capability subclass IVe.

369A—Waupecan silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad ridgetops on outwash plains. Areas are oval or long and narrow and range from 5 to 250 acres in size.

Typically, the surface layer is very dark gray and very dark grayish brown silt loam about 13 inches thick. The subsoil is about 42 inches thick. The upper part of the subsoil is brown to dark brown and dark yellowish brown silt loam and silty clay loam, the middle part is dark yellowish brown clay loam, and the lower part is brown to dark brown sandy clay loam and sandy loam. The underlying material, to a depth of 70 inches, is brown gravelly sand. In places the surface layer is thinner and lighter in color. In some areas the underlying gravelly sand is closer to the surface and the subsoil is thinner, and in some areas the underlying material contains stratified loamy outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and slight rises and make up 10 to 20 percent of the unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material. Runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is medium acid to neutral. Natural fertility and organic-matter content are high. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas are used for urban development. The potential for crops is good, and the potential for most urban uses is good to fair.

This soil is well suited to corn, soybeans, wheat, and oats. It is also well suited to grasses and legumes grown for hay and pasture. No limitations restrict the use of this soil for cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. It lacks sufficient stability because it has high frost heave potential, and the subsoil has moderate shrink-swell potential. The water table is generally below a depth of 5 feet. Water moves downward at a moderate rate through the surface layer and subsoil and at a rapid rate through the underlying material.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a problem for streets and roads but can be minimized by replacing subgrade material. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil may be a problem, but it can be corrected by increasing the size of the absorption field. Care must be taken in selecting sites for waste disposal because of the very rapid permeability of the underlying material, or ground water contamination may result.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide the firm surface required for intensive foot traffic. There are no soil limitations for playgrounds, camp areas, picnic areas, trails, foot paths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

369B—Waupecan silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on broad ridgetops and side slopes on outwash plains. Areas are long and narrow and range from 10 to 120 acres in size.

Typically, the surface layer is very dark gray and very dark grayish brown silt loam about 11 inches thick. The subsoil is about 40 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is dark yellowish brown silty clay loam, and the lower part is dark yellowish brown and dark grayish brown clay loam and gravelly loam. The underlying material, to a depth of 60 inches, is yellowish brown gravelly sand. In some places the surface layer is thinner and lighter in color. In some places the underlying gravelly sand is closer to the surface and the subsoil is thinner. The underlying material contains stratified loamy outwash in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and slight rises and make up 5 to 15 percent of mapped units.

Water and air move at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material. Runoff from cultivated areas is medium. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid or neutral. Natural fertility is high, and organic-matter content is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, although some areas are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, oats, and grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage and winter cover crops help to control erosion. A few slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue and adding animal manure to the soil help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has a moderate shrink-swell potential. The water table is usually at a depth of more than 5 feet. Water moves downward at a moderate rate through the surface layer and subsoil and at a rapid rate through the underlying material.

This soil is only moderately suited to dwellings without basements because it lacks sufficient stability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a problem for streets and roads but can be minimized by replacing subgrade material. Some grading may be necessary. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil may be a problem, but it can be corrected by increasing the size of the absorption field. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material, or ground water contamination may result.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. There are no restrictions to use of this soil for campsites, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather, improves trafficability, and makes these areas more attractive. Capability subclass IIe.

392—Urban land-Orthents, loamy, complex. This map unit consists of built-up areas and adjacent areas which have the surface layer and subsoil removed, mixed, or altered by cutting and filling. Areas of this unit are blocky in shape and range from 20 to 200 acres. They are 15 to 30 percent Urban land and 70 to 85 percent Orthents, loamy.

Because Urban land in the unit is covered by streets, parking lots, buildings, and other structures, soil identification is difficult. These areas are mainly in the more urbanized eastern part of the county.

Orthents, loamy, are areas in which the surface layer and subsoil have been removed, altered, or mixed to the extent that identification is not possible. Soil borings reveal no consistent pattern. Exposed material has varying textures of silt loam, silty clay loam, sandy loam, or clay loam, and most surfaces are calcareous. Orthents are in areas underlain by sandy loam, loam, and silty clay loam glacial till. Some areas are underlain by gravelly sand.

Included in mapping and making up 5 to 10 percent of the map unit are small areas of Drummer, Beecher, Kidder, and Morley soils. Drummer soils, which are poorly drained, are in drainageways. Beecher soils, which are somewhat poorly drained, are on slight rises. Morley soils, which are well drained and moderately well drained, and Kidder soils, which are also well drained, are on ridges and side slopes.

Most areas of Orthents, loamy, do not have the necessary nutrient level, or pH, to support desirable vegetation. Areas where there is natural vegetation support hawthorns, cottonwoods, foxtails, and quackgrasses. Additions of fertilizer and manure improve fertility. Grasses and legumes to plant in well drained and moderately well drained areas include alfalfa, brome, red clover, and tall fescue. Timothy and canarygrasses grow well in poorly drained areas. Crownvetch is recommended in strongly sloping areas.

Erosion control is the main concern in managing sloping areas of Orthents, loamy. Planting to grasses and legumes reduces erosion.

442—Mundelein silt loam. This nearly level, somewhat poorly drained soil is on slight rises near drainageways.

Areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is black and very dark gray silt loam about 12 inches thick. The subsoil is about 23 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is mottled, brown to dark brown and grayish brown silty clay loam; and the lower part is mottled, calcareous, olive brown and dark grayish brown silt loam. The underlying material, to a depth of 60 inches, is calcareous, light olive brown, light brownish gray, and yellowish brown, stratified silt loam and sandy loam outwash. In some places the surface layer is thinner and lighter in color. In some areas calcareous outwash is deeper and the subsoil is thicker.

Included with this soil in mapping are small areas of well drained Proctor soils and poorly drained Drummer and Harpster soils. They occupy upland ridges and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is slow. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil is neutral or mildly alkaline. Natural fertility is high, and organic-matter content is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness may be a problem when the soil is cultivated. Where wetness is a limitation, tile drains and shallow surface ditches can be installed to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility. Conservation tillage reduces soil loss from erosion.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. It is seasonally saturated 1 to 3 feet below the surface. It lacks sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is moderately suited to dwellings without basements because of wetness and the instability in the subsoil. The water table can be lowered by installing tile, and the stability can be improved by strengthening or replacing the base material. It is more difficult to lower the water table to a desired depth for construction of dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by strengthening or replacing subgrade material. Use of this soil for septic tank absorption fields is limited because of wetness. Adding fill material or constructing drainage systems improves suitability for septic tanks, but, where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a problem, but can be overcome by special treatment that seals the bottom of the lagoon.

This soil is only moderately suited to most recreation uses. Wetness is the main problem and can be overcome through the use of tile or shallow drainage ditches. The use of trees, shrubs, and other vegetation reduces dust and helps control erosion. Capability class I.

531B—Markham silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained and well drained soil is on convex ridgetops, knolls, and short, uneven side slopes on end moraines. Areas are irregular in shape and range from 10 to 240 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. The upper part is brown to dark brown and dark yellowish brown silty clay loam, and the lower part is yellowish brown and light yellowish brown silty clay loam. The underlying material, to a depth of 60 inches, is light yellowish brown, calcareous silty clay loam till. In some places the surface layer is thicker and darker. In some other areas, the surface layer is thinner and lighter in color. In some areas stratified silt loam and sandy loam outwash are in the lower part of the subsoil and the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderately slow to slow rate, and runoff from cultivated areas is medium to rapid. The available water capacity is high. Reaction is medium acid to mildly alkaline in the subsoil and varies in the surface layer as a result of local liming practices. Natural fertility is high, and the organic-matter content is moderate. The surface layer is friable, but becomes cloddy if tilled when wet. Root development is somewhat restricted in the underlying material by the compact silty clay loam glacial till.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, pasture, and trees. The potential is fair for most urban uses.

This soil is suited to corn, soybeans, small grains, and grasses and legumes grown for hay and pasture. Erosion control is the main concern in managing cultivated areas. Minimum tillage and winter cover crops prevent excessive soil loss. A few slopes are long and smooth enough to be terraced and farmed on the contour. The return of crop residue to the soil or the regular addition of other organic material helps to improve fertility and tilth and increase water intake.

This soil is suited to many urban uses if proper design and installation procedures are used. It lacks sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below 3 feet. Water moves downward through the soil at a moderately slow to slow rate.

This soil is moderately suited to dwellings without basements because of instability in the subsoil, but this can be corrected by strengthening or replacing the base material. This soil is only moderately suited to dwellings with basements because it is seasonally wet. This can be corrected by installing subsurface drainage systems. Frost heave and shrink-swell are problems for streets and roads. Replacing subgrade material will reduce these problems. The moderately slow to slow rate of water movement in the subsoil and underlying material is a problem when septic tank absorption fields are installed. This can be improved by increasing the size of the absorption field and by adding more porous material. This soil is moderately suited to sewage lagoons because of slope. Some grading may be necessary.

This soil is suited to recreation uses. There are few limitations for the construction of picnic areas, footpaths, trails, and bridle paths. The moderately slow to slow permeability limits the use of this soil for camp areas and playgrounds. Tiling may be needed to prevent ponding. Proper placement of trees, shrubs, and grasses reduces erosion, increases trafficability, and makes these areas more attractive. Capability subclass IIe.

531C2—Markham silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, moderately well drained and well drained soil is on short, uneven side slopes and ridges. Areas are irregular in shape and range from 10 to 140 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is about 21 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is brown to dark brown silty clay, and the lower part is brown and dark brown silty clay loam. The underlying material, to a depth of 60 inches, is calcareous gray and olive gray silty clay loam. In some places the surface layer is lighter is color. In other places it is thicker and darker. In some areas stratified sandy and silty outwash occurs in the lower part of the subsoil and the underlying material. In addition, some areas have a silty clay loam surface layer that has been mixed with the subsoil through tillage.

Included with this soil in mapping are small areas of somewhat poorly drained Beecher soils and poorly drained Milford soils. They occupy shallow depressions and drainageways and make up 0 to 10 percent of the unit.

Water and air move through this soil at a moderately slow to slow rate, and runoff from cultivated areas is rapid. The available water capacity is high. Reaction in the surface layer varies with local liming practices, but it is commonly slightly acid. The subsoil ranges from slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable but becomes compact and cloddy if tilled when wet. Root development is somewhat restricted in the underlying material by compact silty clay loam till.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage, terracing, and contouring reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. Some slopes are not sufficiently long and smooth for terracing and contouring.

This soil is moderately suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate to high shrink-swell potential. The water table is usually below a depth of 3 feet. Water moves downward through the soil at a moderately slow to slow rate.

This soil is moderately suited to dwellings without basements because of instability in the subsoil, but this problem can be corrected by strengthening or replacing the base material. It is moderately suited to dwellings with basements because of seasonal wetness, but this can be corrected by installing subsurface drainage systems. Frost heave and shrink-swell are problems for streets and roads, but can be corrected by replacing subgrade material. Some grading may also be necessary. The moderately slow to slow rate of water movement in the subsoil and underlying material is a problem for septic tank absorption fields. Suitability can be improved by increasing the size of the absorption field and adding more porous material. Suitability for sewage lagoons is limited by the slope and can be improved by grading.

This soil is suited to some recreation uses. There are few limitations for picnic areas, footpaths, and bridle paths. The moderately slow to slow permeability limits the use of these soils for camp areas. Excessive runoff caused by compaction and slow permeability may produce erosion. Leveling is needed before these areas could be used for playgrounds. Proper placement of trees, shrubs, and grasses reduces erosion, increases trafficability, and makes these areas more attractive. Capability subclass IIIe.

570B—Martinsville loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes. Areas are irregular in shape and range from 25 to 200 acres in size.

Typically, the surface layer is brown to dark brown loam about 9 inches thick. The subsoil is about 45 inches thick. The upper part is brown loam and clay loam, and the lower part is mottled, very pale brown sandy clay loam. The underlying material, to a depth of 60 inches, is stratified, pale brown silt loam and sandy loam outwash. In some places the surface layer is thicker and darker; some areas contain more silt throughout the profile; and some areas contain gravelly sand in the lower part of the subsoil and the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Selma soils. They occupy drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff is medium. Available water capacity is high. Reaction in the surface layer varies according to local liming practices, but it is commonly medium acid. The subsoil is neutral to strongly acid. Natural fertility is medium, and the organic-matter content is low. The surface layer is friable and easily tilled through a fairly wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops, hay, pasture, and trees and for most urban uses.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes grown for hay and pasture. If the soil is cultivated, erosion is the main hazard. Conservation tillage and winter cover crops help prevent excessive soil loss. Returning crop residue or the regular addition of other organic material helps to maintain organic-matter content, improve fertility and soil tilth, increase water infiltration, and reduce soil loss. Some slopes are sufficiently long and smooth for terracing and contouring.

This soil is suitable for urban uses if proper design and installation procedures are used. The water table is usually below a depth of 5 feet. The soil does not have sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of a lack of strength and stability in the subsoil. This problem can be corrected by strengthening or replacing the base material. The soil is well suited to dwellings with basements and to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and loam texture provide the firm surface required for heavy foot traffic. There are no soil limitations for camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before the area is suited to playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

570C—Martinsville loam, 5 to 10 percent slopes. This moderately sloping, well drained soil is on convex ridgetops and side slopes. Areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown loam about 9 inches thick. The subsurface layer is brown loam about 5 inches thick. The subsoil is about 45 inches thick. The upper part is brown clay loam; the middle part is mottled, brown to dark brown sandy clay loam; and the lower part is mottled, light yellowish brown and brown sandy loam and silt loam. The underlying material, to a depth of 70 inches, is yellowish brown sandy loam. In some places there is less sand in the surface layer and subsoil. In other areas calcareous sand and gravel are in the underlying material. In some areas much of the surface layer has been eroded through tillage.

Included with this soil in mapping are small areas of somewhat poorly drained Millbrook soils and poorly drained Selma soils. They occupy shallow drainageways and make up less than 10 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil is medium acid to neutral. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content. It may have a tendency to crust or puddle, however, after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed. The potential is good for crops and most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Poor tilth is also a limitation. Conservation tillage, terracing, contouring, and use of grassed waterways reduce soil loss. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. The water table is usually below a depth of 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate.

This soil is well suited to dwellings with and without basements. It is only moderately suited to streets and roads due to shrink-swell, but this problem can be corrected by replacing subgrade material. It is well suited to septic tank absorption systems. It is suited to sewage lagoons if specially treated to seal the bottom.

This soil is suited to most recreation uses. Good drainage and loam texture provide a firm surface, which is required for heavy foot traffic. There are few limitations for camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

656B—Octagon silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on side slopes and convex ridgetops and end moraines. Areas are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is very dark brown silt loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part is brown to dark brown silt loam, the middle part is brown to dark brown clay loam, and the lower part is brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown loam till.

In some places, the surface layer is thicker and darker or it is lighter in color. The underlying material contains stratified sandy loam and silt loam outwash in some places.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert and Lisbon soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium to slow. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but it is commonly neutral. The subsoil is slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to good for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of instability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave potential is a problem for constructing streets and roads but can be minimized by replacing subgrade material. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil may be a problem, but can be corrected by increasing the size of the absorption field.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. There are no limitations for the construction of camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before the area is suited to playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

656C2—Octagon silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on ridgetops and side slopes on end moraines. Areas are irregular in shape and range from 5 to 180 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is about 24 inches thick. The upper part is brown to dark brown clay loam, and the lower part is calcareous, brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown loam till. In some places the surface layer is thicker and darker or thinner and lighter in color than in the typical profile. In some areas the underlying material contains stratified sandy loam and silt loam outwash. In some areas in the northeastern part of the county, sand and gravel are in the underlying material. In some small areas the surface layer is loam and clay loam because it has been mixed with subsoil through tillage.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert and Lisbon soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil is slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good to fair for crops and most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Minimum tillage, terracing, contouring, and grassed waterways reduce soil loss. Returning crop residue to the soil and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss. Some areas are unsuited to terracing and contouring because of short, uneven slopes and irregular topography.

This soil is suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements due to instability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. The soil is well suited to septic tank absorption fields. The rate of water movement in the subsoil may be a problem, but it can be corrected by increasing the size of the absorption field.

This soil is suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. There are few limitations for the construction of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

656D2—Octagon silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on short, uneven side slopes and narrow ridges on end moraines. Areas are oblong and range from 3 to 60 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 21 inches thick. It is reddish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown loam till. In some places the surface layer is thinner and lighter in color. In others it is loam or clay loam because it has been mixed with subsoil by tillage. In some areas the underlying material contains sand and gravel.

Included with this soil in mapping are small areas of somewhat poorly drained Herbert soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up less than 10 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium to rapid. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is neutral or mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Some areas of this soil are farmed. The potential is fair for crops and most urban uses.

This soil is suited to grasses and legumes grown for hay and pasture. Under proper management to control erosion, corn and soybeans can be grown as part of the rotation. There is a severe erosion hazard. Careful management is needed to control erosion and maintain fertility and good tilth. Terracing, contouring, use of grassed waterways, and conservation tillage reduce soil erosion. In the best cropping system, more small grains are grown than corn and soybeans. Use of terracing and contouring is limited in some areas by short, uneven slopes and irregular topography.

This soil is suitable for urban development if proper design and installation procedures are used. It does not have sufficient stability because it has moderate frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate. The water table is usually below a depth of 6 feet. Slopes are somewhat too strong.

This soil is moderately suited to dwellings without basements because of slope and instability in the subsoil. Stability can be improved by strengthening or replacing base material. Some grading may be necessary to correct restrictions caused by slope. The soil is only moderately suited to dwellings with basements because of slope and may need some grading. Frost heave is a problem for constructing streets and roads but can be corrected by replacing base material. Grading helps to correct slope restrictions. The soil is moderately suited to septic tank absorption systems, but slope may restrict the size of the absorption field. Grading may help correct slope restrictions. If the rate of water movement in the subsoil is a problem, the size of the absorption field should be increased.

This soil is suited to some recreation uses. There are few limitations to its use for footpaths, trails, and bridle paths. Camp areas and picnic areas require some leveling before construction is feasible. Playgrounds require extensive leveling. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Winter sports are well suited. Capability subclass IVe.

696B—Zurich silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained to well drained soil is on short, uneven side slopes and convex ridges on outwash plains. Areas are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is brown to dark brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. The upper part is brown to dark brown silt loam, the middle part is dark yellowish brown silty clay loam, and the lower part is mottled, yellowish brown silt loam. The underlying material, to a depth of 60 inches, is calcareous, light yellowish brown, stratified silt loam and fine sandy loam outwash. In some places, the surface layer is thicker and darker, and the subsoil is thicker and deeper to carbonates. In some areas, stratified, loamy outwash is closer to the surface, and the subsoil is thinner.

Included with this soil in mapping are small areas of somewhat poorly drained Wauconda and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is medium. The available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly neutral. The subsoil is slightly acid to moderately alkaline. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range in moisture content. It may have a tendency to crust or puddle, however, after hard rains.

Most areas of this soil are farmed. The potential is good to fair for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of instability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. The soil is well suited to septic tank absorption fields.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. There are no soil limitations for the construction of camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather, increases trafficability, and makes these areas more attractive. Capability subclass IIe.

697—Wauconda silt loam. This level or nearly level, somewhat poorly drained soil is on slight rises and in shallow depressions on outwash plains. Areas are irregular in shape and range from 3 to 160 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface is dark grayish brown silt loam about 3 inches thick. The subsoil is about 25 inches thick. The upper part is mottled, dark grayish brown silt loam; the middle part is grayish brown and brown silty clay loam; and the lower part is mottled, calcareous, grayish brown silt loam. The underlying material, to a depth of 60 inches, is mottled, calcareous, grayish brown, stratified silt loam and sandy loam outwash. In some places the surface layer is thicker and darker. In some areas the underlying calcareous loamy outwash is deeper in the profile.

Included with this soil in mapping are small areas of well drained and moderately well drained Zurich soils and poorly drained Drummer soils. They occupy upland ridges and drainageways and make up 5 to 15 percent of the unit.

Water and air move through this soil at a moderate rate, and runoff from cultivated areas is slow to medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices, but is commonly neutral. The subsoil is slightly acid to mildly alkaline. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and fair to poor for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Wetness may be a problem when the soil is cultivated. Where wetness is a limitation, tile drains and shallow surface ditches can be installed to improve drainage. Returning crop residue to the soil and adding animal manure help to maintain tilth and organic-matter content and improve fertility.

This soil can be made suitable for many urban uses if proper design and installation procedures are used. It is seasonally saturated 1 to 3 feet below the surface. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward through the soil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of wetness and the instability in the subsoil. The water table can be lowered by installing tile, and stability can be improved by strengthening or replacing the base material. It is more difficult to lower the water table to a desired depth for construction of dewllings with basements. Frost heave is a problem for constructing streets and roads but can be corrected by strengthening or replacing subgrade material. Use of this soil for septic tank absorption fields is limited because of wetness. Adding fill material and constructing subsurface drainage systems improve suitability for septic tanks, but, where possible, sanitary facilities should be connected to commercial sewers and treatment plants. The suitability of the soil for sewage lagoons is limited by wetness. Seepage is also a problem, but it can be overcome by special treatment that seals the bottom of the lagoon.

This soil is only moderately suited to most recreation uses. Wetness is the main problem and can be overcome through the use of tile or shallow surface ditches. The use of trees, shrubs, and other vegetation reduces dust. Capability class I.

791A—Rush silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on upland ridgetops and knolls. Areas are oval and range from 5 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsurface layer is dark grayish brown and brown to dark brown silt loam about 7 inches thick. The subsoil is about 34 inches thick. The upper part is brown to dark brown and dark yellowish brown silty clay loam, and the lower part is dark yellowish brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, brown gravelly sand. In some places the surface layer is thicker and darker. In some areas, the subsoil is thinner and sand and gravel occur closer to the surface. In some areas the underlying material contains stratified sandy and silty outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material. Runoff from cultivated areas is slow. Available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is strongly acid to slightly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a fairly wide range of moisture content. It has a tendency to crust or puddle, however, after hard rains.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to good for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. There are no major soil limitations to growing cultivated crops. There is a tendency for a crust to form on the surface, but this problem can be reduced by conservation tillage. Returning crop residue and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward at a moderate rate in the surface layer and subsoil and at a rapid rate in the underlying material.

This soil is only moderately suited to dwellings without basements because of instability in the subsoil, but this problem can be corrected by strengthening or replacing the base material or putting the foundation below frost level. It is well suited to dwellings with basements. Frost heave potential is a problem for constructing streets and roads but can be minimized by replacing subgrade material. The soil is well suited to septic tank absorption fields. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are constructed on these soils.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide the firm surface required for intensive foot traffic. There are no soil limitations for constructing playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

791B—Rush silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops, knolls, and side slopes. Areas are oblong and range from 5 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 35 inches thick. The upper part is brown to dark brown silty clay loam, the middle part is dark yellowish brown silty clay loam, and the lower part is dark yellowish brown gravelly clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In some areas the surface layer is thicker and darker. In some places, sand and gravel are closer to the surface and the subsoil is thinner. In some areas stratified loamy outwash is in the underlying material.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. They occupy shallow depressions and drainageways and make up 5 to 15 percent of the unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material. Runoff from cultivated areas is medium. Available water capacity is high. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is medium acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. It has a tendency to crust or puddle, however, after hard rains.

Most areas of this soil are farmed, although some areas in the eastern part of the county are used for urban development. The potential is good for crops and fair to good for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is cultivated. Conservation tillage and winter cover crops help to control erosion. A few slopes are sufficiently long and smooth for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward at a moderate rate through the surface layer and subsoil and at a rapid rate through the underlying material.

This soil is only moderately suited to dwellings without basements because of instability in the subsoil, but this can be corrected by strengthening or replacing the base material. It is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. The soil is well suited to installation of septic tank absorption fields. Care must be taken in selecting sites for waste disposal due to the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are constructed on this soil.

This soil is well suited to most recreation uses. Good drainage and silt loam texture provide the firm surface required for heavy foot traffic. There are no soil limitations for the construction of camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required for playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

791C2—Rush silt loam, 5 to 10 percent slopes, eroded. This moderately sloping, well drained soil is on side slopes, convex ridgetops, and knolls on uplands. Areas are oblong and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 41 inches thick. The upper part is brown to dark brown silty clay loam; and the lower part is yellowish brown and brown to dark brown clay loam and sandy clay loam. The underlying material, to a depth of 60 inches, is calcareous gravelly loam. In places the surface layer is thicker and darker. In some areas the subsoil is thinner and sand and gravel are closer to the surface. Some areas contain stratified sand and silt outwash. In some areas the surface layer is clay loam that has been mixed with subsoil through tillage.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up less than 10 percent of the map unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material. Surface runoff from cultivated areas is medium to rapid. Reaction in the surface layer varies with local liming practices, but it is commonly slightly acid. The subsoil is neutral or slightly acid. Natural fertility is medium, and organic-matter content is low. The surface layer is friable and easily tilled over a relatively wide range of moisture content. However, it tends to crust or puddle after hard rains, especially where the plow layer contains subsoil material.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is fair for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for cultivated crops. A crust forms easily on the surface. Conservation tillage, terracing, contouring, and use of grassed waterways help to reduce the amount of soil loss. Returning crop residue and adding animal manure help maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 6 feet. Water moves downward at a moderate rate through the surface layer and subsoil and at a very rapid rate through the underlying material.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but this can be corrected by strengthening or replacing the base material or putting foundations below frost level. This soil is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. This soil is well suited to septic tank absorption fields. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are constructed on this soil.

This soil is suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface layer that can withstand heavy foot traffic. There are few limitations for the construction and placement of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before this soil can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

792A—Bowes silt loam, 0 to 2 percent slopes. This nearly level, well drained and moderately well drained soil is on broad upland ridgetops and knolls. Areas are irregular or oval and range from 4 to 260 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 38 inches thick. The upper part is brown silty clay loam, the middle part is yellowish brown and dark yellowish brown silty clay loam, and the lower part is brown and dark brown gravelly clay loam and gravelly sandy loam. The underlying material, to a depth of 60 inches, is calcareous, brown gravelly sand. In places the surface layer is thinner and lighter in color. In some areas, calcareous sand and gravel are closer to the surface and the subsoil is thinner. The underlying material contains stratified, loamy outwash in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. They are in shallow depressions and drainageways and make up 5 to 15 percent of the map unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a rapid rate through the underlying material. Surface runoff from cultivated areas is slow. Reaction in the surface layer varies with local liming practices, but is commonly medium acid. The subsoil is slightly acid to moderately alkaline. Natural fertility is high and organic-matter content is moderate. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed. The potential is good for crops and good to fair for most urban uses.

This soil is well suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. There are no limitations for cultivated crops. Returning crop residue to the soil and adding animal manure help to maintain good tilth and organic-matter content and improve fertility.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and in the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the lack of sufficient stability in the subsoil, but this can be corrected by strengthening foundations or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a problem for constructing local streets and roads, but this problem can be minimized by replacing subgrade material. This soil is well suited to installation of septic tank absorption fields. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are constructed on this soil.

This soil is well suited to recreation uses. The nearly level surface, good drainage, and silt loam texture provide a firm surface that can withstand intensive foot traffic. There are no soil limitations for the construction and placement of playgrounds, camp areas, picnic areas, trails, footpaths, and bridle paths. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability class I.

792B—Bowes silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on side slopes, convex ridges, and knolls. Areas are oval and range from 5 to 160 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is dark brown silt loam about 5 inches thick. The subsoil is about 36 inches thick. The upper part is dark brown silty clay loam, the middle part is dark yellowish brown gravelly clay loam, and the lower part is brown and dark brown gravelly clay loam and gravelly sandy loam. The underlying material, to a depth of 60 inches, is calcareous, brown gravelly sand. In places the surface layer is thinner and lighter in color. In some areas depth to calcareous sand and gravel is greater and the subsoil is thinner. The underlying material contains stratified, loamy outwash in some areas.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate, and surface runoff from cultivated areas is medium. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is slightly acid. Natural fertility is high, and organic-matter content is moderate. Available water capacity is high. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is good for crops and good to fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if this soil is used for cultivated crops. Conservation tillage and winter cover crops help to control erosion. A few areas have slopes which are long enough and smooth enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve natural fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the instability in the subsoil, but this problem can be corrected by strengthening foundations or replacing the base material. This soil is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads, but it can be minimized by replacing subgrade material. This soil is well suited to septic tank absorption fields. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are installed.

This soil is well suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. There are no soil limitations for the construction and use of camp areas, picnic areas, trails, footpaths, and bridle paths. Some leveling may be required before this soil is suited to playgrounds. Proper placement of trees, shrubs, and other vegetation reduces dust in dry weather. Capability subclass IIe.

792C—Bowes silt loam, 5 to 10 percent slopes. This moderately sloping, well drained soil is on convex ridges and side slopes. Areas are oblong and range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is dark brown silt loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is dark brown and dark yellowish brown clay loam and gravelly clay loam. The underlying material, to a depth of 60 inches, is brown gravelly sand. In some places the surface layer is thinner and lighter in color or is eroded by tillage. In some areas sand and gravel are closer to the surface and the subsoil is thinner. In some areas the underlying material contains stratified, loamy outwash.

Included with this soil in mapping are small areas of somewhat poorly drained Virgil soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways and make up 5 to 10 percent of the map unit.

Water and air move at a moderate rate through the surface layer and subsoil and at a rapid rate through the underlying material. Surface runoff from cultivated areas is medium to rapid. Reaction in the surface layer varies with local liming practices but is commonly slightly acid. The subsoil is slightly acid to medium acid. Natural fertility is high, and organic-matter content is moderate. The surface layer is friable and easily tilled over a relatively wide range of moisture content.

Most areas of this soil are farmed, but some areas in the eastern part of the county are used for urban development. The potential is fair to good for crops and fair for most urban uses.

This soil is suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Erosion is the main hazard if the soil is used for cultivated crops. Minimum tillage, terracing, contouring, and grassed waterways help to reduce soil loss. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

This soil is well suited to urban development if proper design and installation procedures are used. It does not have sufficient stability because it has high frost heave potential and the subsoil has moderate shrink-swell potential. The water table is usually below a depth of 5 feet. Water moves downward through the surface layer and subsoil at a moderate rate.

This soil is only moderately suited to dwellings without basements because of the instability in the subsoil, but this problem can be corrected by strengthening foundations, replacing the base material, and placing footings below the frost line. This soil is well suited to dwellings with basements. Frost heave is a problem for constructing streets and roads but can be minimized by replacing subgrade material. Some grading may also be necessary. This soil is well suited to septic tank absorption fields. Care must be taken in selecting sites for waste disposal because of the rapid permeability of the underlying material. Ground water contamination is a possibility if sanitary facilities are constructed.

This soil is suited to most recreation uses. Good drainage and the silt loam texture provide a firm surface that can withstand heavy foot traffic. There are few limitations for the construction of camp areas, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before this soil can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IIIe.

864—Pits, quarry, limestone. This map unit consists of limestone quarries. Areas of this map unit are primarily along the Fox River and range in size from 15 to 70 acres. They are adjacent to Ripon and Faxon soils. One quarry is located in southwestern Kane County, east of Big Rock. Most of these quarries are not mined at present and are filled with water. An abandoned quarry in North Aurora is used as a landfill, and another at Batavia has been converted into a city park.

865—Pits, gravel. These miscellaneous areas are sites for sand and gravel extraction. They are steep and range from 10 to several hundred acres in size. Some of these areas are abandoned, and the pits are partially filled with water.

Because of irregular topography, gravel pits that are not mined are suited to recreation. Water-filled pits can be stocked with fish, for example.

921B—Faxon-Ripon complex, 0 to 5 percent slopes. This map unit consists of level and nearly level, poorly drained Faxon soils on flood plains and gently sloping, well drained Ripon soils on ridges and side slopes adjacent to the Fox River. Small islands in the Fox River are dominantly Faxon soils. Some areas of the complex are dissected by deep or moderately deep drainageways. Areas range from 5 to several hundred acres size. This complex is 50 to 65 percent Faxon soils, 20 to 30 percent Ripon soils, and 10 to 25 percent included soils. The soils are in areas so narrow or so small that it is not practical to separate them in mapping.

Typically, the Faxon soil has a surface layer of black and very dark gray clay loam about 13 inches thick. The subsoil is about 15 inches thick. The upper part is mottled, dark gray clay loam, and the lower part is mottled, light olive gray and gray sandy clay loam. Fractured light gray limestone bedrock is at a depth of 28 inches. In places, free carbonates are throughout the soil and depth to bedrock is more than 5 feet.

Typically, the Ripon soil has a surface layer of black and very dark gray silt loam about 13 inches thick. The subsoil is about 19 inches thick. The upper part is brown to dark brown silty clay loam, and the lower part is yellowish brown clay loam. Fractured pale yellow limestone bedrock is at a depth of 32 inches. In places, the underlying material is silty clay loam glacial till or it includes sand and gravel.

Included with this complex in mapping are small areas of Houghton, Lena, and Rodman soils and Urban land-Orthents, loamy, complex. Houghton and Lena soils are muck. They are on flats adjacent to Faxon soils along island and mainland shores of the Fox River. Rodman soils are moderately steep to steep and are above Ripon soils. They contain gravel throughout. Urban land-Orthents, loamy, complex consists of areas reworked by man. They are along the river in areas altered, removed, or added to the naturally occurring soil.

Permeability is moderate in Faxon and Ripon soils. Available water capacity is low in Faxon soils and moderate in Ripon soils. Surface runoff is slow or very slow in Faxon soils and medium in Ripon soils. Reaction is neutral or mildly alkaline in Faxon soils and neutral or slightly acid in Ripon soils. Root penetration is restricted by limestone bedrock at a depth of 24 to 40 inches.

Most areas of these soils are in grasses or native hardwoods and are generally parks or forest preserves. These soils have good potential for wetland and woodland wildlife habitat, fair to poor potential for crops, and poor potential for most urban uses.

This complex is best suited to wildlife habitat, parks, or esthetic plantings. Faxon soils are severely limited for picnic, camping, and playground areas because of wetness and flooding. Ripon soils can be used for picnic, camping, and playground areas without any major limitations.

Faxon soils can be planted to grasses suitable for wetland wildlife. Cottonwoods and willows grow well on these soils. Oak can be planted if competing vegetation is controlled or removed. Ripon soils can be planted to grasses and legumes suitable for openland and woodland wildlife. These soils are well suited to pine, spruce, oaks, and cedars.

This complex is moderately suited to cropland, but high quality forage can be produced. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and decreases water infiltration.

The soils in this complex can be made suitable for some urban uses if proper design and installation procedures are used. In Faxon soils depth to the seasonal water table is less than 1 foot. These soils are subject to occasional flooding. They do not have sufficient stability because they have high frost heave potential and moderate shrink-swell potential. Water moves downward through the soils at a moderate rate. Depth to fractured limestone bedrock is 24 to 40 inches. In Ripon soils the water table is usually below a depth of 5 feet. These soils do not have sufficient stability because they have high frost heave potential and the subsoil has moderate shrink-swell potential. Water moves downward at a moderate rate. Depth to fractured limestone bedrock is 24 to 36 inches.

Faxon soils are not suited to dwellings with or without basements because of wetness, depth to bedrock, and flooding. Ripon soils are not suited to dwellings with basements because of depth to bedrock, and they are only moderately suited to dwellings without basements. Adding fill material or placing foundation footings below frost line minimize this problem. Frost heave is a problem for construction of streets and roads on both Faxon and Ripon soils, but it can be minimized by adding suitable fill material and protecting the soils from flooding. Septic tanks do not function well because of the shallow depth to bedrock. Effluent may pollute the Fox River by seeping through the fractured bedrock. All sanitary facilities should be connected to commercial sewers and treatment plants. This complex is not suited to sewage lagoons. Faxon part in capability subclass IIIw, Ripon part in capability subclass IIe.

938C—**Miami-Casco complex, 4 to 10 percent slopes.** This complex consists of moderately sloping, well drained soils on upland ridges, side slopes, and knolls. Areas range from 5 to 90 acres in size and contain both Miami and Casco soils in significantly varying proportions. This complex is 30 to 70 percent Miami soils, 20 to 50 percent Casco soils, and 5 to 10 percent included soils. In places Miami soils are on ridgetops and upper side slopes, and Casco soils are on middle and lower side slopes. In other areas the two soils occur side by side.

Typically, the Miami soil has a surface layer of dark brown silt loam about 4 inches thick. The subsurface layer is brown to dark brown silt loam about 3 inches thick. The subsoil is about 25 inches thick. The upper part is dark yellowish brown clay loam, and the lower part is brown clay loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown loam till. In places the surface layer is thicker and darker. In places depth to the underlying calcareous loam till is greater and the subsoil is thicker.

Typically, the Casco soil has a surface layer of brown to dark brown loam about 7 inches thick. The subsoil is about 15 inches thick. The upper part is brown to dark brown clay loam, and the lower part is dark yellowish brown sandy clay loam. The underlying material, to a depth of 60 inches, is yellowish brown, calcareous gravelly sand. In places the surface layer is thicker and darker. In places depth to the underlying calcareous gravelly sand is greater or loamy outwash is in the underlying material.

Included with this complex in mapping are small areas of Drummer and Will soils. These soils are poorly drained and are in drainageways and depressions.

Miami soils have moderate permeability; Casco soils have moderate permeability in the surface layer and subsoil and very rapid permeability in the underlying material. Available water capacity is high in Miami soils and low in Casco soils. Miami soils have medium natural fertility and low organic-matter content; Casco soils have low natural fertility and low organic-matter content.

Most areas of these soils are in pasture and woodland. A few areas are used for urban development. These soils have fair potential for growing cultivated crops and good potential for most urban uses.

The soils in the complex are suited to corn, soybeans, wheat, and oats and to grasses and legumes grown for hay and pasture. Controlling erosion and droughtiness and maintaining fertility are the main problems when this unit is used for cultivated crops. Areas used continuously for row crops need protection from water erosion. Conservation tillage reduces erosion and helps conserve moisture. In a few areas slopes are long enough for terracing and contouring. Returning crop residue to the soil and adding animal manure help to maintain organic-matter content, improve fertility and tilth, increase water infiltration, and reduce soil loss.

The soils in the complex are well suited to urban uses if proper design and installation procedures are used. The water table is usually below a depth of 5 feet. Water moves downward through Miami soils at a moderate rate and through Casco soils at a moderate rate in the surface layer and subsoil and at a very rapid rate in the underlying material. These soils have moderate shrink-swell potential in the subsoil.

This complex is well suited to dwellings with basements. Casco soils are also well suited to dwellings without basements. Miami soils are only moderately suited to dwellings without basements because they lack sufficient stability in the subsoil, but this can be corrected by strengthening or replacing the base material. Casco soils are well suited to construction of streets and roads. Miami soils are only moderately suited to streets and roads because of the moderate frost heave potential, but this can be minimized by replacing subgrade material. These soils are well suited to installation of septic tank absorption fields. Because of the very rapidly permeable underlying material, there is potential pollution of ground water supplies when septic systems are installed in Casco soils. Casco soils are also unsuited to sewage lagoons because of the seepage hazard in the underlying material. Miami soils are suited to sewage lagoons.

This complex is suited to most recreation uses. Good drainage and silt loam and loam textures provide a firm surface that can withstand heavy foot traffic. There are few limitations for the construction and use of campsites, picnic areas, trails, footpaths, and bridle paths. Leveling is needed before areas can be used for playgrounds. Proper placement of trees, shrubs, and other vegetation helps to control wind and water erosion. Capability subclass IVe.

938E—Miami-Casco complex, 10 to 20 percent slopes. This map unit consists of strongly sloping and moderately steep, well drained soils on upland ridges and side slopes. Areas range from 10 to 140 acres in size and contain both Miami and Casco soils in varying proportions. This unit is 30 to 60 percent Miami soils and 20 to 50 percent Casco soils. In places the Miami soil is on upper side slopes and ridgetops, and the Casco soil is on middle and lower side slopes. In other areas the two soils are side by side on ridgetops and side slopes. The soils in the unit occur in such an irregular pattern and are so intricately mixed that it is not practical to separate them in mapping.

Typically, the Miami soil has a surface layer of dark brown silt loam about 4 inches thick. The subsurface layer is pale brown and brown silt loam about 6 inches thick. The subsoil is about 19 inches thick. The upper part is dark yellowish brown clay loam, and the lower part is brown clay loam. The underlying material, to a depth of 60 inches, is yellowish brown, calcareous loam till. In places the surface layer is thicker and darker. In places the underlying calcareous loam is deeper.

Typically, the Casco soil has a surface layer of brown to dark brown loam about 7 inches thick. The subsoil is about 11 inches thick. The upper part is brown to dark brown clay loam, and the lower part is dark yellowish brown sandy loam. The underlying material, to a depth of 60 inches, is calcareous, yellowish brown gravelly sand. In places, depth to the underlying gravelly sand is greater or less than is typical. In some areas loamy outwash is in the underlying material.

Included with this complex in mapping are small areas of Drummer and Will soils that make up less than 10 percent of the map unit. These soils are poorly drained and are in drainageways and depressions.

The Miami soil is moderately permeable. The Casco soil is moderately permeable in the surface layer and subsoil and very rapidly permeable in the underlying material. Available water capacity is high in the Miami soil and low in Casco soil. The Miami soil has medium natural fertility and low organic-matter content. The Casco soil has low natural fertility and low organic-matter content.

Most areas of these soils are in pasture or woodland. A few areas are used for urban development. The potential is fair to poor for cultivated crops and most urban uses.

This unit is best suited to grasses and legumes grown for hay and pasture. On strongly sloping soils, corn and soybeans can be grown as part of the crop rotation if erosion is controlled. Yields are likely to be low in areas where Casco soils predominate, however, because of the low fertility and low available water capacity. There is also a severe erosion hazard. Careful management is needed to control erosion and maintain fertility and good tilth. Contouring, use of grassed waterways, and conservation tillage reduce soil erosion. Terracing is limited in some areas by irregular topography and gravelly sand at or near the surface. Moderately steep areas are not suited to intensive use of row crops such as corn and soybeans. They are best suited to grasses and legumes grown for hay and pasture.

Strongly sloping areas are suitable for urban development if proper design and installation procedures are used, but moderately steep areas are poorly suited. The water table is usually below a depth of 5 feet. Water moves downward through Miami soil at a moderate rate and through Casco soil at a moderate rate in the surface layer and subsoil and at a very rapid rate in the underlying material. These soils have a moderate shrink-swell potential in the subsoil. Miami soil has moderate frost heave potential.

Strongly sloping areas of these soils are only moderately suited to dwellings with and without basements. The suitability can be improved by grading slopes. Miami soil is weak in the subsoil, but this can be corrected by strengthening or replacing the base material. The complex is only moderately suited to septic tank absorption fields because of excessive slope, which may restrict the size of the absorption field. There is also potential pollution of ground water supplies when septic systems are installed in Casco soil. Slope is a problem for construction of streets and roads. Seepage in the underlying material makes Casco soil unsuitable for sewage lagoons. Care must be taken in selecting sites for waste disposal.

Moderately steep areas of these soils are poorly suited to urban development. Alternative sites should be selected when possible and the soils planted to trees, shrubs, and other ornamentals and grasses to minimize erosion. Areas adjacent to urban developments are well suited to winter sports. With proper vegetative cover they also attract a variety of songbirds and increase the esthetic value of the development.

This complex is suited to some recreation uses (fig. 11). It is moderately limited for paths and trails because of excessive slope and is poorly suited to camp and picnic areas. Extensive leveling is required for camp or picnic areas. The complex should not be used for playgrounds. Proper placement of trees, shrubs, and other vegetation is important for controlling erosion. Capability subclass VIe.

1103—Houghton muck, wet. This nearly level, very poorly drained soil is in closed depressions. Areas are rounded or oval and range from 5 to 80 acres in size.

Typically, this soil is undrained and has standing water during much of the year. Sedges, rushes, and willows are the predominant vegetation. This soil consists of several layers, or tiers, of black, decomposed organic material which have a total thickness of 60 inches. When rubbed between the fingers, the upper tiers are very dark brown. The lower tiers contain dark brown, partly decomposed plant fibers. The underlying material is at a depth of more than 60 inches and is commonly sedimentary peat, silt loam, sandy loam, and silty clay loam. In some areas free carbonates are at or near the surface. In other places the surface layer is thinner and dark colored and contains less organic matter.

Included with this soil in mapping are small areas of poorly drained Drummer soils. They occupy drainageways and make up 10 to 15 percent of the unit.

Water and air move through this soil at a rapid rate, and runoff is very slow. Reaction is neutral or slightly acid. Organic-matter content is very high, and natural fertility is low and medium. The soil is usually too wet for cultivation.

Most areas of this soil are idle. The potential is poor for cultivated crops and very poor for most urban uses.

This soil is difficult to drain sufficiently to cultivate. It is on the lower landscape positions, and suitable outlets are generally not available. Tile lines are difficult to install and maintain. Surface ditches are beneficial in some areas, but unless the water table is controlled, wind erosion and subsidence result.

This soil is very poorly suited to most urban uses. It is frequently saturated less than 1 foot below the surface. It is also subject to frequent flooding. It has low strength and low stability because of the high organic-matter content and high frost heave potential. Water moves downward through the soil at a rapid rate.

Alternative sites should be selected for urban development when possible. This soil lacks the strength and stability to support foundations for dwellings, but it helps to place pilings below the organic material. Frequent water saturation and flooding are also problems and may be difficult or expensive to correct. This soil is poorly suited to streets and roads because of low strength, low stability, wetness, and flooding. Sanitary facilities should not be placed on this soil because of wetness, flooding hazard, and seepage potential. There is potential pollution of ground water supplies when sanitary facilities are placed on these soils.

This soil is unsuited to most recreation uses. Wetness is the main problem and is difficult to correct. This soil provides a good habitat for wetland wildlife, and some areas can be developed for hunting. Capability subclass Vw.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data 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 (*11*).

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

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, 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.

About 253,926 acres of Kane county was farmland in 1974 (*4*). Of this, 106,218 acres was in corn, 69,358 acres in soybeans, 14,064 acres in wheat and oats, 15,614 acres in hay, 2,795 acres in other crops, mainly vegetables, 9,312 acres in pasture, and 36,555 acres in woods, waste, and idle land.

The acreage in crops and pasture has gradually decreased in recent years as more land is used for urban development. In 1974, the urban land in the county was about 75,000 acres. The most dramatic increases have occurred since 1965. The use of this soil survey to help make land use decisions that will influence the future role of farming in the county is discussed in the section "General soil map for broad land use planning".

Erosion control is a management concern on about 45 percent of the cropland in the county. Soils that have slopes more than 2 percent are susceptible to erosion. On some soils, such as Miami clay loam, 10 to 15 percent slopes, severely eroded, little or none of the surface layer remains.

Soil 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 that have a clayey subsoil and on those that have a layer below the subsoil that limits the rooting depth of growing crops. Markham, Morley, and Varna soils, for example, have a clayey subsoil. In Casco, Lorenzo, and Rodman soils, a root-restricting layer of sand and gravel is close to the surface; and limestone bedrock restricts rooting in Ripon soils. Erosion also reduces the productivity of soils, such as Casco, Lorenzo, and Rodman soils, that tend to be droughty by further reducing the available water in these soils. The second reason that erosion is damaging is because it causes sediment and nutrients to enter streams. Erosion control minimizes the pollution of streams by sediment and improves the quality of water for municipal use, recreation, and fish and wildlife.

Erosion control provides a protective surface cover, reduces runoff, and increases infiltration. A cropping system that keeps a plant cover on the soil for extended periods can hold soil erosion loss to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require hay and pasture, the legumes and grass forage crops in the cropping system reduce erosion on sloping land and provide nitrogen and improve tilth for the following crops.

Terracing is most effective for controlling erosion on sloping soils. Terraces reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils that have long, even slopes, such as Birkbeck, Bowes, Camden, Catlin, Dodge, Saybrook, and St. Charles soils. Some soils, such as Casco, Lorenzo, and Rodman soils, have irregular topography, and terraces generally are not practical. Some areas of most of the sloping soils in the county can be terraced.

Where slopes are not long and smooth enough for terraces, cropping systems must provide substantial plant cover. Minimum tillage and leaving crop residue on the surface help to increase infiltration and reduce runoff and erosion. These practices can be adapted to all of the soils in the county. No-tillage is also effective in controlling erosion and is increasing in popularity.

Farming on the contour and contour stripcropping are also increasing. Like terracing, these practices are best suited to soils that have smooth, uniform slopes. Some areas of most soils are suitable for contouring and contour stripcropping.

Wind erosion is a hazard on most of the nearly level soils in the county, but is particularly damaging to organic soils, such as Houghton and Lena soils. Wind erosion can damage these soils in a short time if wind is strong and the soils are dry and lack plant cover. Maintaining plant cover, mulch, or an irregular surface through proper tillage minimizes wind erosion. Windbreaks are also effective in reducing wind erosion.

Drainage is a management concern on much of the farmland in the county. About 32 percent of the farmland is poorly drained or very poorly drained soils, such as Canisteo, Drummer, Millington, Milford, Otter, Peotone, Selma, and Will soils and the organic Houghton and Lena soils. About 14 percent of the farmland is somewhat poorly drained. The most abundant soils in this group are Beecher, Brenton, Elburn, Elliott, Flanagan, and Millbrook soils. Unless artificially drained, very poorly drained to somewhat poorly drained soils are wet enough to damage growing crops during most years.

The design of drainage systems differs from soil to soil. For many somewhat poorly drained soils, subsurface drainage with tile is adequate. Most intensively cropped, poorly drained soils require both surface and subsurface drainage. Soils that have a clayey subsoil, such as Beecher, Elliott, and Milford soils, require closer placement of drainage lines because of the moderately slow or slow rate of water movement. Soils on bottomlands, Millington and Otter soils need to be protected from flooding.

The organic Houghton and Lena 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. Maintaining 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 minimizes oxidation and subsidence in these soils.

Soil fertility is naturally low in Casco, Kidder, and Rodman soils, which make up about 1 percent of the farmland. These soils are in more sloping areas and have low or moderate available water capacity. They have poor potential for crops.

The organic Houghton and Lena soils have low to medium fertility. They require special fertility practices because they are low in inorganic nutrients.

About 21 percent of the soils in the county have medium natural fertility. These soils developed under forest and are low in content of organic matter. The most abundant soils in this group are Camden, Dodge, Fox, and Miami soils. Most of these soils respond well to fertilizer and produce high yields.

About 73 percent of the farmland has high fertility. These soils formed under or were influenced by prairie grasses. The most abundant soils in this group are Brenton, Drummer, Harvard, Octagon, Proctor, Saybrook, and Varna soils. For the most part, these soils have a deep rooting zone and high available water capacity. Some of the soils in the group are among the most productive in the world.

Tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous. Most of the soils in the county have good tilth. Those with good tilth have a silt loam surface layer high in organic matter and have granular structure.

Soils low in organic matter generally have weak structure in the surface layer. Intense rainfall causes formation of a crust. This crust is hard when dry and is difficult for water to penetrate. It reduces infiltration and increases runoff. Adding animal manure and leaving crop remains on the surface improves tilth of these soils.

Improving tilth is also a management concern on soils that have a clayey subsoil. These soils are sticky when wet and hard and cloddy when dry, particularly where the plow layer contains subsoil material. These soils should be plowed when they are not oversaturated with water.

Providing adequate *soil moisture* is a concern in dry years for soils that are shallow and moderately deep to sand and gravel. These soils have low or moderate available water capacity. Included are Casco, Dresden, Fox, Lorenzo, Rodman, and Warsaw soils. During most years, available water is high enough for sustained high yields in Dresden, Fox, and Warsaw soils. Low available water limits yields during most years in Casco, Lorenzo, and Rodman soils.

Assistance in managing specific tracts of land is available from the local office of the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents (*9*). Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop 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.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops (*13*). The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at two levels: capability class, and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

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 other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Windbreaks and environmental plantings

Windbreaks are established to protect livestock, buildings, and yards from wind and snow. Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broad-leaved and coniferous species provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility of the soil. They protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. A healthy planting stock of suitable species planted properly on a well prepared site and maintained in good condition can insure a high degree of plant survival.

Table 6 shows the height that locally grown trees and shrubs are expected to reach on various kinds of soil in 20 years. The estimates in table 6, based on measurements and observation of established plantings that have been given adequate care, can be used as a guide in planning windbreaks and screens. Additional information about planning windbreaks and screens and the planting and care of trees can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from nurserymen.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

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

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and lawns and landscaping local roads and streets, are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

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 7 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, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading.

In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the 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 8 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 same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil (*15*). Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce 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.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, 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 13 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, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as 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 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. 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 10 the 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 (fig. 12). 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 favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

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.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

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 11 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 the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. 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 during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Areas for intensive recreation are increasing in popularity in Kane County. Onsite investigation is necessary in planning and evaluating areas.

Wildlife habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable 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 the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are bluegrass, orchardgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and ragweed.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, ash, cherry, black walnut, apple, hawthorn, dogwood, hickory, blackberry, and sumac. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and honeysuckle.

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 plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, white cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, pondweed, cattail, cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include white-tailed deer, warblers, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer mice, and chipmunks.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. 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 or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of 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 15 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 after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not 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 important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*14*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 16, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquolls (*Hapl*, meaning simple horizons, plus *aquoll*, the suborder of Mollisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-silty, mixed, mesic, Typic Haplaquolls.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Drummer is an example of a soil series in Kane County. It is classified, as shown in table 16, fine-silty, mixed, mesic Typic Haplaquolls.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*12*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Batavia series

The Batavia series consists of deep, well drained and moderately well drained, moderately permeable soils on outwash plains. They formed in calcareous, silty loess and the underlying, stratified loamy outwash. Slopes range from 0 to 5 percent.

Batavia soils are similar to Harvard and Plano soils. Harvard soils have a thinner loess cover than Batavia soils. Plano soils have a mollic epipedon. Batavia soils commonly adjoin Drummer, St. Charles, and Virgil soils on the landscape. Drummer soils have a mollic epipedon and are poorly drained. St. Charles soils have a lighter colored surface layer than Batavia soils. Virgil soils are somewhat poorly drained and are at lower elevations than Batavia soils.

Typical pedon of Batavia silt loam, 0 to 2 percent slopes, 80 feet west and 1,400 feet north from the southeast corner of sec. 34, T. 39 N., R. 6 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; common fine tubular pores; neutral; abrupt smooth boundary.

A2—8 to 11 inches; dark grayish brown (10YR 4/2) silt loam; weak thin platy structure parting to moderate medium granular; friable; few thin very dark grayish brown (10YR 3/2) organic coatings lining pores; neutral; clear smooth boundary.

B1—11 to 17 inches; brown to dark brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; friable; few thin very dark grayish brown (10YR 3/2) organic coatings lining pores; neutral; clear smooth boundary.

B21t—17 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—24 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B23t—31 to 42 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular and angular blocky structure; firm; discontinuous thin dark yellowish brown (10YR 4/4) clay films on faces of peds; few medium rounded dark accumulations (Fe and Mn oxides); slightly acid; abrupt smooth boundary.

IIB31—42 to 49 inches; brown (10YR 5/3) clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few medium rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

IIB32—49 to 55 inches; yellowish brown (10YR 5/4) silt loam and thin strata of fine sandy loam; common medium distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/8) mottles; very weak coarse subangular blocky structure; friable; few medium rounded dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

IIC—55 to 60 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) stratified silt loam and fine sandy loam; common medium distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/8) mottles; massive; friable; few fine rounded dark accumulations (Fe and Mn oxides); neutral.

Thickness of the loess ranges from 40 to 55 inches. The thickness of the solum ranges from 48 to 65 inches.

The A horizon ranges from 9 to 12 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The A2 horizon has value of 4 to 6 and chroma of 2 or 3. The B1 horizon is light silty clay loam or heavy silt loam. The B2t horizon has value of 4 or 5 and chroma of 4 to 6. It is silty clay loam that is 27 to 35 percent clay. Reaction is slightly acid or medium acid. The IIB3 horizon is clay loam, silt loam, or sandy loam. The IIC horizon has value of 4 to 6 and chroma of 3 to 6. It is slightly acid to mildly alkaline, stratified silt loam, loam, or fine sandy loam.

Beecher series

The Beecher series consists of deep, somewhat poorly drained, slowly permeable soils on end moraines. These soils formed in calcareous, silty material and the underlying silty clay loam till. Slopes range from 0 to 3 percent.

Beecher soils are similar to Elliott soils. Elliott soils have a mollic epipedon. Beecher soils commonly adjoin Markham, Milford, and Morley soils on the landscape. Markham and Morley soils are well drained and moderately well drained and are at higher elevations than Beecher soils. Milford soils are poorly drained, have a mollic epipedon, and are in drainageways at lower elevations.

Typical pedon of Beecher silt loam, 975 feet west and 1,990 feet south of the northeast corner of sec. 23, T. 39 N., R. 8 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; neutral; clear smooth boundary.

A2—7 to 11 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

IIB21t—11 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

IIB22t—16 to 22 inches; olive brown (2.5Y 4/4) silty clay; common medium distinct dark grayish brown (2.5Y 4/2) and light olive brown (2.5Y 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; common moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds; few dolomitic pebbles; slightly acid; clear smooth boundary.

IIB23t—22 to 29 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) and grayish brown (2.5Y 5/2) mottles; moderate coarse subangular blocky structure; firm; common thin dark grayish brown (2.5Y 4/2) clay films on faces of peds; common dolomitic pebbles; slightly acid; clear smooth boundary.

IIB3—29 to 35 inches; light olive brown (2.5Y 5/4) silty clay loam; many medium distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; common dolomitic pebbles; slight effervescence; mildly alkaline; gradual smooth boundary.

IIC—35 to 60 inches; light yellowish brown (10YR 6/4) silty clay loam; many medium distinct grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/8) mottles; massive; friable; common dolomitic pebbles; strong effervescence; moderately alkaline.

Thickness of the silty loess mantle is less than 18 inches. Thickness of the solum and depth to free carbonates range from 24 to 45 inches.

The A horizon ranges from 6 to 9 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or silty clay loam. The A2 horizon has value of 4 or 5 and chroma of 2. The IIB2t horizon is heavy silty clay loam or silty clay that is 35 to 45 percent clay. It has value of 4 to 6 and chroma of 2 to 4. Mottles are distinct. Reaction is medium acid or slightly acid. The IIC horizon has value of 5 or 6 and chroma of 2 to 4. Reaction is moderately alkaline or mildly alkaline.

Birkbeck series

The Birkbeck series consists of deep, moderately well drained, moderately permeable soils on ground moraines. These soils formed in calcareous, silty loess and the calacareous, underlying loamy till. Slopes range from 0 to 10 percent.

Birkbeck soils are similar to Catlin and Dodge soils. Catlin soils have a mollic epipedon. Dodge soils have a thinner loess cover than Birkbeck soils and contain more sand to a depth of 40 inches. Birkbeck soils commonly adjoin Drummer and Sabina soils on the landscape. Drummer soils are poorly drained and are at lower elevations than Birkbeck soils. Sabina soils are somewhat poorly drained, have a fine textured B2t horizon, and are also at lower elevations.

Typical pedon of Birkbeck silt loam, 0 to 2 percent slopes, 410 feet south and 1,850 feet west of the northeast corner of sec. 20, T. 38 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 7/3) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

B1—7 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B21t—14 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky; firm; continuous moderately thick brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—22 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct very pale brown (10YR 7/3) and common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; continuous moderately thick brown (10YR 5/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B23t—29 to 36 inches; brown (10YR 5/3) silty clay loam; common medium distinct very pale brown (10YR 7/3) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; discontinuous moderately thick brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); strongly acid; clear smooth boundary.

B31—36 to 42 inches; brown (10YR 5/3) silty clay loam; common medium distinct very pale brown (10YR 7/3) and yellowish brown (10YR 5/8) mottles; weak medium and coarse subangular blocky structure; firm; discontinuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); medium acid; abrupt smooth boundary.

IIB32—42 to 53 inches; dark yellowish brown (10YR 4/4) clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few thin brown to dark brown (10YR 4/3) clay films on faces of peds; few medium rounded dark accumulations (Fe and Mn oxides); few dolomitic pebbles; slightly acid; clear smooth boundary.

IIC—53 to 60 inches; brown (10YR 5/3) loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive; common dolomitic pebbles; mildly alkaline.

Thickness of the loess ranges from 40 to 55 inches. Thickness of the solum and depth to free carbonates range from 44 to 65 inches.

The Ap horizon is 7 to 12 inches thick. It has value of 4 or 5 and chroma of 2 or 3. An A2 horizon 3 to 4 inches thick is common in uncultivated areas. The B2t horizon is silty clay loam that is 27 to 35 percent clay. Reaction is strongly acid to slightly acid. The IIB3 horizon is clay loam or heavy loam. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Bowes series

The Bowes series consists of deep, well drained and moderately well drained soils on outwash plains. These soils are moderately permeable in the surface layer and subsoil and rapidly permeable in the underlying material. They formed in calcareous, silty and loamy material and are underlain by gravelly sand. Slopes range from 0 to 10 percent.

Bowes soils are similar to Batavia, Rush, and Waupecan soils, and they commonly adjoin Drummer, Rush, and Waupecan soils. Batavia soils contain less coarse sand and gravel in the lower part of the solum and the underlying material than Bowes soils. Drummer soils are poorly drained, have a mollic epipedon, and are in drainageways and depressions. Rush soils have a lighter colored surface horizon than Bowes soils. Waupecan soils have a mollic epipedon.

Typical pedon of Bowes silt loam, 0 to 2 percent slopes, 330 feet north and 330 feet west of the center of sec. 19, T. 42 N., R. 8 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; weak very fine and fine granular structure; friable; medium acid; abrupt smooth boundary.

A2—9 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak thick platy structure parting to weak fine granular; friable; slightly acid; clear smooth boundary.

B21t—13 to 19 inches; brown (10YR 4/3) silty clay loam; moderate very fine and fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B22t—19 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; weak coarse prismatic structure parting to moderate fine subangular blocky; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; slightly acid; gradual smooth boundary.

B23t—28 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; medium acid; gradual smooth boundary.

B24t—36 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; few pebbles; medium acid; clear smooth boundary.

IIB31t—43 to 46 inches; brown (10YR 4/3) gravelly clay loam; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; firm; thin discontinuous dark yellowish brown (10YR 3/4) clay films as stains on grains; mildly alkaline; clear smooth boundary.

IIB32—46 to 51 inches; dark brown (7.5YR 3/2) gravelly sandy loam; weak medium subangular blocky structure; friable; mildly alkaline; clear smooth boundary.

IIC—51 to 61 inches; brown (7.5YR 4/4) gravelly sand; single grained; common dolomitic cobbles; strong effervescence; moderately alkaline.

The thickness of the silty mantle ranges from 36 to 55 inches. Thickness of the solum and depth to calcareous sand and gravel range from 40 to 65 inches.

The A horizon ranges from 7 to 13 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The A2 horizon, where present, has value of 4 or 5 and chroma of 2 to 4. The B2t horizon has value of 4 or 5 and chroma of 3 to 6. It is slightly acid to strongly acid silty clay loam that is 27 to 35 percent clay. The IIB3 horizon is clay loam, sandy clay loam, gravelly clay loam, gravelly loam, or loam. The IIC horizon is moderately alkaline gravelly sand or gravelly sandy loam. It has value of 4 or 5 and chroma of 3 or 4.

Brenton series

The Brenton series consists of deep, somewhat poorly drained, moderately permeable soils on flats and knolls near drainageways on outwash plains. These soils formed in calcareous silt and the underlying loamy outwash. Slopes range from 0 to 3 percent.

Brenton soils are similar to Elburn and Millbrook soils. Elburn soils contain less sand in the B horizon than Brenton soils. Millbrook soils lack a mollic epipedon. Brenton soils commonly adjoin Drummer and Proctor soils on the landscape. Drummer soils are poorly drained, have a thicker mollic epipedon, and are at lower elevations on the landscape than Brenton soils. Proctor soils are well drained and moderately well drained and are more sloping than Brenton soils. They are on ridges at higher elevations.

Typical pedon of Brenton silt loam 270 feet north and 250 feet west of the southeast corner of sec. 36, T. 39 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A12—8 to 12 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A3—12 to 17 inches; very dark grayish brown (10YR 3/2) silt loam; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; common thin very dark gray (10YR 3/1) organic coatings on faces of peds and lining pores; few dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B21t—17 to 24 inches; brown to dark brown (10YR 4/3) silty clay loam; common fine distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; continuous thin dark grayish brown (10YR 4/2) organic coatings on faces of peds; common dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—24 to 33 inches; brown to dark brown (2.5Y 4/3) silty clay loam; many coarse distinct grayish brown (2.5Y 5/2) and brownish yellow (10YR 6/8) mottles; moderate coarse subangular blocky structure; firm; patchy thin dark grayish brown (10YR 4/2) organic coatings on faces of peds; common dark accumulations (Fe and Mn oxides); slightly acid; abrupt smooth boundary.

IIB3—33 to 45 inches; grayish brown (2.5Y 5/2) loam; many medium distinct light olive brown (2.5Y 5/6) and brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; friable; common dark accumulations (Fe and Mn oxides); neutral; gradual smooth boundary.

IIC—45 to 60 inches; light olive brown (2.5Y 5/4) stratified sandy loam and loam; many coarse distinct grayish brown (2.5Y 5/2) and brownish yellow (10YR 6/8) mottles; massive; friable; slight effervescence; mildly alkaline.

The thickness of the solum and depth to free carbonates range from 40 to 60 inches. The depth to stratified loamy sediments ranges from 24 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 18 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 2 or 3. Mottles are distinct. Reaction is slightly acid or neutral. The IIB3 horizon is silt loam, loam, fine sandy loam, or clay loam. The IIC horizon has value of 4 to 6 and chroma of 2 to 4, and is mottled. It is slightly acid to moderately alkaline loam, silt loam, or fine sandy loam.

Camden series

The Camden series consists of deep, well drained and moderately well drained, moderately permeable soils on outwash plains. These soils formed in calcareous, silty loess and the underlying, stratified, loamy outwash. Slopes range from 0 to 10 percent.

Camden soils are similar to Martinsville and St. Charles soils. Martinsville soils have more sand in the upper part of the solum than Camden soils, and St. Charles soils contain less sand to a depth of 40 inches. St. Charles soils also have a thicker loess cover. Camden soils commonly adjoin Millbrook and Drummer soils on the landscape. Millbrook soils are somewhat poorly drained and are at lower elevations than Camden soils. Drummer soils are poorly drained and have a mollic epipedon.

Typical pedon of Camden silt loam, 2 to 5 percent slopes, 670 feet south and 330 feet west of the northeast corner of sec. 8, T. 41 N., R. 8 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine and fine granular structure; friable; medium acid; abrupt smooth boundary.

A2—7 to 11 inches; brown (10YR 5/3) silt loam; moderate fine granular structure; friable; medium acid; clear smooth boundary.

B1t—11 to 16 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; continuous thin dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—16 to 26 inches; brown to dark brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; continuous thin dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—26 to 34 inches; brown (7.5YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; continuous moderately thick dark brown (7.5YR 4/2) films on faces of peds; medium acid; abrupt smooth boundary.

IIB23t—34 to 39 inches; brown (7.5YR 4/4) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; continuous moderately thick dark brown (7.5YR 3/2) clay films on faces of peds; medium acid; abrupt smooth boundary.

IIB24t—39 to 44 inches; brown (7.5YR 4/4) clay loam; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; very firm; continuous thin dark brown (7.5YR 4/2) clay films on faces of peds; medium acid; abrupt smooth boundary.

IIB3—44 to 50 inches; yellowish brown (10YR 5/4) silt loam; very weak coarse subangular blocky structure; friable; dark brown (7.5YR 4/2) clay films in root channels; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—50 to 60 inches; yellowish brown (10YR 5/4) stratified silt loam and loamy sand; massive; friable; strong effervescence; mildly alkaline.

Thickness of loess ranges from 24 to 36 inches, and thickness of the solum ranges from 40 to 60 inches.

The A horizon ranges from 7 to 12 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. An A2 horizon is lacking in some pedons. The B1t horizon, where present, is silty clay loam. The IIB2t horizon is clay loam, sandy clay loam, or silty clay loam. The B2t horizon and IIB2t horizon have value of 4 to 6 and chroma of 3 to 6. They are 27 to 35 percent clay. Reaction is neutral to strongly acid. The B3 horizon is silt loam, loam, or sandy loam. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. It is neutral or mildly alkaline, stratified silt loam, sandy loam, loam, or loamy sand.

Canisteo series

The Canisteo series consists of deep, poorly drained, moderately permeable soils in depressions and drainageways on uplands. These soils formed in stratified loamy outwash. Slopes range from 0 to 2 percent.

Canisteo soils are similar to Harpster, Millington, and Selma soils. Harpster soils have a calcic horizon and are fine-textured silty soils. Millington soils have a mollic epipedon more than 24 inches thick. Canisteo soils commonly adjoin Selma and Will soils on the landscape. Selma and Will soils have a lower calcium carbonate equivalent in the solum than Canisteo soils. Will soils also contain more sand and gravel.

Typical pedon of Canisteo loam 1,150 feet south and 1,025 feet west of the center of sec. 16, T. 42 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) loam; moderate fine granular structure; friable; few snail shells; slight effervescence; moderately alkaline; clear smooth boundary.

A12—8 to 11 inches; black (10YR 2/1) loam; weak fine subangular blocky structure; friable; few snail shells; strong effervescence; moderately alkaline; abrupt smooth boundary.

B1g—11 to 20 inches; very dark gray (10YR 3/1) clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common fine irregular dark accumulations (Fe and Mn oxides); few snail shells; strong effervescence; mildly alkaline; clear smooth boundary.

B21g—20 to 28 inches; gray (10YR 5/1) clay loam; many medium distinct brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) mottles; weak very fine prismatic structure parting to moderate fine subangular blocky; friable; common fine irregular lime accumulations; few snail shells; slight effervescence; mildly alkaline; clear smooth boundary.

B22g—28 to 35 inches; gray (5Y 5/1) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; friable; many fine irregular lime accumulations; few snail shells; strong effervescence; moderately alkaline; abrupt smooth boundary.

C1g—35 to 46 inches; gray to light gray (5Y 6/1) loam; common coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few fine irregular lime accumulations; strong effervescence; moderately alkaline; gradual smooth boundary.

C2g—46 to 60 inches; gray (5Y 5/1) silt loam; few coarse distinct yellowish brown (10YR 5/6) mottles; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 36 inches. Thickness of the mollic epipedon ranges from 14 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1. It is dominantly loam, but the range includes clay loam and silt loam. The B2g horizon has value of 4 or 5 and chroma of 1 or 2, and is distinctly mottled. It is clay loam or loam that is 20 to 35 percent clay. The C horizon has value of 5 or 6 and chroma of 1 to 4. It is silt loam, loam, or sandy loam.

Casco series

The Casco series consists of well drained soils on kamic moraines and eskers. These soils are moderately permeable in the solum and very rapidly permeable in the underlying material. They are shallow to sand and gravel. They formed in a thin layer of loamy outwash and the underlying sand and gravel. Slopes range from 10 to 20 percent.

Casco soils are similar to Fox and Lorenzo soils. Fox soils have a thicker solum than Casco soils. Lorenzo soils have a mollic epipedon. Casco soils commonly adjoin Fox, Kane, Miami, and Will soils. Kane soils are somewhat poorly drained and have a mollic epipedon. Miami soils have a thicker solum and have less gravel and sand in the solum and the underlying material than Casco soils. Will soils are poorly drained, have a mollic epipedon, and are in drainageways adjacent to Casco soils.

Typical pedon of Casco loam, 10 to 15 percent slopes, 350 feet north and 1,980 feet east of the southwest corner of sec. 10, T. 42 N., R. 6 E.

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

B21t—8 to 15 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; many thin dark brown (7.5YR 3/2) organic coatings on faces of peds; few dolomitic pebbles; slightly acid; clear smooth boundary.

B22t—15 to 21 inches; brown to dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; friable; common thin dark brown (7.5YR 3/2) organic coatings on faces of peds and as stains on grains; common dolomitic pebbles; neutral; abrupt smooth boundary.

IIC—21 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; mildly alkaline.

The thickness of the solum and depth to free carbonates range from 12 to 24 inches.

The A horizon ranges from 6 to 10 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is dominantly loam, but includes silt loam and sandy loam. The B2t horizon is clay loam or sandy clay loam that is 27 to 35 percent clay. It has value of 4 or 5 and chroma of 3 or 4. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. Reaction is moderately alkaline or mildly alkaline.

Catlin series

The Catlin series consists of deep, well drained and moderately well drained, moderately permeable soils on till plains. These soils formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 0 to 5 percent.

Catlin soils are similar to Birkbeck and Saybrook soils and commonly adjoin Drummer, Flanagan, and Saybrook soils on the landscape. Birkbeck soils lack a mollic epipedon. Drummer soils are poorly drained and are at lower elevations than Catlin soils. Flanagan soils are somewhat poorly drained, have a fine-textured B2t horizon, and are less sloping. Saybrook soils have a thinner loess cover than Catlin soils and contain more sand to a depth of 40 inches.

Typical pedon of Catlin silt loam, 2 to 5 percent slopes, 80 feet east and 2,540 feet south of the northwest corner of sec. 23, T. 39 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam; moderate very fine granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 13 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

B1—13 to 18 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

B21t—18 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common thin brown to dark brown (10YR 4/3) clay films on faces of peds; few dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—25 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common moderately thick brown to dark brown (10YR 4/3) clay films on faces of peds and few thin very dark grayish brown (10YR 3/2) organic coatings as stains on grains; few dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B23t—34 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and light olive brown (2.5Y 5/6) mottles; moderate medium and coarse subangular blocky structure; discontinuous thin dark grayish brown (10YR 4/2) and brown to dark brown (10YR 4/3) clay films on faces of peds; common dark accumulations (Fe and Mn oxides); slightly acid; abrupt smooth boundary.

IIB31—43 to 50 inches; brown to dark brown (7.5YR 4/4) clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few dark accumulations (Fe and Mn oxides); few dolomitic pebbles; slightly acid; clear smooth boundary.

IIB32—50 to 56 inches; brown (7.5YR 5/4) loam; few fine distinct yellowish brown (10YR 5/6) mottles; very weak coarse subangular blocky structure; friable; few dark accumulations (Fe and Mn oxides); common dolomitic pebbles; neutral; gradual smooth boundary.

IIC—56 to 70 inches; yellowish brown (10YR 5/4) and light brown (7.5YR 6/4) loam; massive; friable; common dolomitic pebbles; slight effervescence; mildly alkaline.

The thickness of loess ranges from 40 to 55 inches, and thickness of the solum and depth to free carbonates range from 45 to 65 inches. The thickness of the mollic epipedon ranges from 10 to 15 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 3 to 6. The IIB3 horizon is clay loam, loam, or silt loam. The IIC horizon has value of 5 or 6 and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Dodge series

The Dodge series consists of deep, well drained, moderately permeable soils on end moraines. These soils formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 2 to 10 percent.

Dodge soils are similar to Birkbeck and Miami soils and commonly adjoin Drummer, Herbert and Miami soils on the landscape. Birkbeck soils have a thicker solum and have a thicker loess cover. Poorly drained Drummer soils have a mollic epipedon and are on flats and in depressions of uplands. Herbert soils are somewhat poorly drained and are in shallow depressions. Miami soils have a thinner solum and are more sloping than the Dodge soils.

Typical pedon of Dodge silt loam, 2 to 5 percent slopes, 1,915 feet north and 288 feet east of the southwest corner of sec. 12, T. 38 N., R. 7 E.

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

B1—9 to 12 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; friable; continuous thin brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—12 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine angular blocky structure; firm; continuous thin brown (10YR 4/3) clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine angular blocky structure; firm; continuous thin brown (10YR 4/3) clay films on faces of peds; many medium irregular dark accumulations (Fe and Mn oxides); strongly acid; clear smooth boundary.

IIB23t—24 to 30 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB3—30 to 37 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/6) mottles; coarse subangular blocky structure; firm; slight effervescence; neutral; gradual smooth boundary.

IIC—37 to 60 inches; yellowish brown (10YR 5/4) loam till; few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; few pebbles; common fine light gray (10YR 7/1) lime accumulations; strong effervescence; mildly alkaline.

The thickness of the loess ranges from 20 to 36 inches. Thickness of the solum and depth to free carbonates range from 24 to 40 inches.

The A horizon ranges from 4 to 10 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Most pedons lack an A2 horizon. The B1 horizon, where present, is silt loam or silty clay loam. The B2t and IIB2t horizons have value of 4 or 5 and chroma of 3 or 4. They are 28 to 32 percent clay. Reaction is strongly acid to slightly acid. The IIB3 horizon is clay loam or loam. The IIC horizon has value of 5 and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline. Content of fragments that are more than 2 millimeters in diameter ranges from 5 to 15 percent.

Dresden series

The Dresden series consists of well drained soils on uplands and terraces. These soils are moderately permeable in the solum and rapidly permeable in the underlying material. They formed in loamy outwash and are underlain by gravelly sand. They are moderately deep to the gravelly sand. Slopes range from 0 to 10 percent.

Dresden soils are similar to Fox and Warsaw soils and commonly adjoin Fox and Kane soils on the landscape. Fox soils have a lighter colored A horizon and are at higher elevations than Dresden soils. Warsaw soils have a mollic epipedon and are on broad flats adjacent to Dresden soils. Kane soils are somewhat poorly drained, have a mollic epipedon, and are in shallow depressions.

Typical pedon of Dresden silt loam, 0 to 2 percent slopes, 720 feet south and 1,340 feet west of the center of sec. 21, T. 41 N., R. 8 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; weak very fine granular structure; friable; slightly acid; abrupt smooth boundary.

B1—7 to 11 inches; brown to dark brown (10YR 4/3) silty clay loam; weak very fine subangular blocky structure; friable; neutral; clear smooth boundary.

B21t—11 to 19 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

IIB22t—19 to 27 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; thin continuous brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB3—27 to 32 inches; mixed dark yellowish brown (10YR 4/4) and brown to dark brown (7.5YR 4/2) sandy clay loam; weak coarse subangular blocky structure; friable; neutral; abrupt smooth boundary.

IIC—32 to 60 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum and depth to free carbonates range from 24 to 40 inches.

The A horizon ranges from 6 to 12 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly silt loam, but the range includes loam. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. It is silty clay loam, clay loam, or sandy clay loam that is 27 to 34 percent clay. Reaction is slightly acid or neutral. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. Reaction is moderately alkaline or mildly alkaline.

Drummer series

The Drummer series consists of deep, poorly drained, moderately permeable soils on flats and in depressions on glacial moraines and outwash plains. These soils formed in silty material and the underlying, stratified outwash. Slopes range from 0 to 2 percent.

Drummer soils are similar to Otter and Selma soils. Otter soils have a mollic epipedon more than 24 inches thick. Selma soils contain more sand in the solum than Drummer soils. Drummer soils commonly adjoin Brenton, Flanagan, and Miami soils on the landscape. Brenton and Flanagan soils are somewhat poorly drained and are more sloping than Drummer soils. Miami soils are well drained, lack a mollic epipedon, and are on nearby ridges and side slopes.

Typical pedon of Drummer silty clay loam, 990 feet north and 270 feet west of the southeast corner of sec. 11, T. 38 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 13 inches; black (10YR 2/1) silty clay loam; moderate fine subangular blocky structure parting to weak fine granular; friable; slightly acid; clear smooth boundary.

B1—13 to 21 inches; very dark gray (10YR 3/1) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common thin black (10YR 2/1) organic coatings and stains on faces of peds; slightly acid; clear smooth boundary.

B21g—21 to 28 inches; dark gray (10YR 4/1) silty clay loam; common fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; thick black (10YR 2/1) krotovina; neutral; clear smooth boundary.

B22g—28 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common thick very dark grayish brown (10YR 3/2) organic coatings lining pores and common thin dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; clear smooth boundary.

B23g—36 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/8) mottles; fine medium prismatic structure; firm; few thin dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; abrupt smooth boundary.

IIB3g—43 to 50 inches; gray (5Y 5/1) sandy loam; few fine distinct brownish yellow (10YR 6/8) and light olive brown (2.5Y 5/4) mottles; weak coarse subangular blocky structure; friable; neutral; clear smooth boundary.

IIC1g—50 to 58 inches; gray (5Y 5/1) sandy loam; common medium distinct light olive brown (2.5Y 5/4) and brownish yellow (10YR 6/8) mottles; single grained; friable; neutral; abrupt smooth boundary.

IIC2g—58 to 70 inches; grayish brown (2.5Y 5/2) loam; many medium distinct yellowish brown (10YR 5/8 and 5/4) mottles; massive; friable; slight effervescence; mildly alkaline.

The thickness of the solum and depth to free carbonates range from 45 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 23 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is silty clay loam or silt loam. The B2g horizon has value of 4 to 6 and chroma of 1 or 2, and has distinct mottles. Reaction is neutral or slightly acid. The IIB3g horizon is silt loam, loam, or sandy loam. The IICg horizon is stratified loam, sandy loam, loamy sand, or silt loam. Reaction is neutral to moderately alkaline. It has value of 4 to 6 and chroma of 1 to 4.

Elburn series

The Elburn series consists of deep, somewhat poorly drained, moderately permeable soils on broad outwash plains. These soils formed in calcareous, silty loess and the underlying, stratified loamy outwash. Slopes range from 0 to 3 percent.

Elburn soils are similar to Brenton and Virgil soils. Brenton soils have a thinner loess cover than Elburn soils. Virgil soils lack a mollic epipedon. Elburn soils commonly adjoin Drummer and Plano soils on the landscape. Drummer soils are poorly drained and are in drainageways at lower elevations than Elburn soils. Plano soils are well drained and moderately well drained and are at higher elevations than Elburn soils.

Typical pedon of Elburn silt loam, 2,440 feet south and 195 feet east of the center of sec. 5, T. 40 N., R. 7 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, weak very fine granular structure; friable; neutral; clear smooth boundary.

A12—9 to 12 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; neutral; clear smooth boundary.

B1t—12 to 19 inches; brown and dark brown (10YR 4/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak very fine subangular blocky structure; friable; common thin dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; gradual smooth boundary.

B21t—19 to 29 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; moderate fine subangular blocky structure; firm; discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—29 to 35 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; firm; discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; neutral; gradual smooth boundary.

B23t—35 to 42 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; friable; discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; neutral; gradual smooth boundary.

IIB3—42 to 48 inches; light yellowish brown (2.5Y 6/4) loam; many medium distinct light olive gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; mildly alkaline; abrupt smooth boundary.

IIC—48 to 60 inches; mixed light yellowish brown (2.5Y 6/4), light olive gray (2.5Y 6/2), and yellowish brown (10YR 5/6) stratified silt loam and sandy loam; massive; very friable; moderately alkaline.

The thickness of the loess ranges from 40 to 55 inches. Thickness of the solum and depth to free carbonates range from 45 to 60 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B1 horizon is silt loam or silty clay loam. The B2t horizon has value of 4 to 6 and chroma of 2 to 4. Reaction is neutral to medium acid. The IIB3 horizon is clay loam, loam, or sandy loam. The IIC horizon is stratified silt loam, loam, and sandy loam. It has value of 5 or 6 and chroma of 2 to 4. Reaction is mildly alkaline or moderately alkaline.

Elliott series

The Elliott series consists of deep, somewhat poorly drained, moderately slowly permeable soils on end moraines. These soils formed in calcareous, silty material and the calcareous, underlying silty clay loam till. Slopes range from 0 to 3 percent.

Elliott soils are similar to Beecher soils. Beecher soils lack a mollic epipedon. Elliott soils commonly adjoin Markham, Milford, and Varna soils on the landscape. Markham and Varna soils are moderately well drained and are more sloping than Elliott soils. Also, Markham soils lack a mollic epipedon. Milford soils are poorly drained and are in drainageways at lower elevations than Elliott soils.

Typical pedon of Elliott silt loam, 2,460 feet south and 165 feet east of the center of sec. 4, T. 39 N., R. 8 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A3—8 to 12 inches; very dark gray (10YR 3/1) silt loam; weak fine subangular blocky structure; friable; neutral; clear smooth boundary.

IIB21t—12 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous thin very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

IIB22t—17 to 22 inches; brown to dark brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

IIB23t—22 to 28 inches; olive brown (2.5Y 4/4) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; firm; patchy thin dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (Fe and Mn oxides); neutral; clear wavy boundary.

IIB3—28 to 35 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; very weak coarse subangular blocky structure; friable; few dolomitic pebbles; slight effervescence; mildly alkaline; gradual smooth boundary.

IIC—35 to 60 inches; light olive brown (2.5Y 5/4) silty clay loam; many medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; few medium light gray (10YR 7/1) lime accumulations; few dolomitic pebbles; strong effervescence; moderately alkaline.

Thickness of the silty mantle is less than 18 inches. Thickness of the solum and depth to free carbonates range from 24 to 40 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The IIB2t horizon has value of 4 to 6 and chroma of 2 to 4. It is silty clay loam that is 35 to 42 percent clay. The IIC horizon has value of 4 to 6 and chroma of 2 to 4.

Faxon series

The Faxon series consists of poorly drained, moderately permeable soils on bottom lands along the Fox River. These soils are moderately deep to bedrock and formed in loamy alluvium. Slopes range from 0 to 2 percent.

Faxon soils are similar to Selma and Will soils, but Selma and Will soils lack lithic contacts. Faxon soils commonly adjoin Millington soils and are closely associated with Ripon soils on the landscape. Millington soils have a thicker mollic epipedon and do not have lithic contacts. Ripon soils are well drained, contain less sand in the solum, are more sloping, and are at higher elevations than Faxon soils.

Typical pedon of Faxon clay loam from an area of Faxon-Ripon complex, 0 to 5 percent slopes, 200 feet south and 600 feet east of the center of sec. 34, T. 40 N., R. 8 E.

Ap—0 to 7 inches; black (10YR 2/1) clay loam; moderate fine granular structure; friable; mildly alkaline; clear smooth boundary.

A3—7 to 13 inches; very dark gray (10YR 3/1) clay loam; weak fine subangular blocky structure; friable; few fine rounded dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B21g—13 to 19 inches; dark gray (5Y 4/1) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine rounded dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B22g—19 to 28 inches; light olive (5Y 6/2) and gray (5Y 5/1) sandy clay loam; moderate medium distinct light olive brown (2.5Y 5/6) and strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; friable; common thick very dark gray (10YR 3/1) organic material; common fine rounded dark accumulations (Fe and Mn oxides); common dolomitic pebbles; mildly alkaline; abrupt smooth boundary.

IIR—28 inches; dolomitic limestone bedrock.

The thickness of the solum and depth to limestone bedrock range from 24 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1. It is commonly clay loam, but the range includes silt loam and silty clay loam. The B2g horizon has value of 4 or 5 and chroma of 1 or 2, and has distinct mottles. It is clay loam, sandy clay loam, or silty clay loam that is 18 to 32 percent clay.

Flanagan series

The Flanagan series consists of deep, somewhat poorly drained, moderately permeable soils. These soils are on knolls and slight rises near drainageways on ground moraines. They formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 0 to 3 percent.

Flanagan soils are similar to Lisbon and Elliott soils. Lisbon soils have a thinner solum and contain less clay in the control section than Flanagan soils. Flanagan soils commonly adjoin Catlin, Drummer, and Saybrook soils on the landscape. Catlin and Saybrook soils are well drained and moderately well drained and are more sloping than Flanagan soils. Drummer soils are poorly drained and are in drainageways at lower elevations than Flanagan soils.

Typical pedon of Flanagan silt loam, 10 feet south and 65 feet east of the northwest corner of sec. 9, T. 40 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; weak very fine granular structure; friable; neutral; abrupt smooth boundary.

A3—8 to 15 inches; black (10YR 2/1) silt loam; weak very fine granular structure; friable; neutral; clear smooth boundary.

B21t—15 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate very fine subangular blocky structure; firm; continuous very dark gray (10YR 3/1) organic coatings and clay films on faces of peds; neutral; clear smooth boundary.

B22t—19 to 24 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; firm; continuous very dark gray (10YR 3/1) organic coatings and clay films on faces of peds; neutral; clear smooth boundary.

B23t—24 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; discontinuous very dark gray (10YR 3/1) organic coatings and clay films on faces of peds; neutral; clear smooth boundary.

B24t—29 to 34 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; neutral; clear smooth boundary.

B31—34 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure; friable; neutral; abrupt smooth boundary.

IIB32—42 to 47 inches; light brownish gray (2.5Y 6/2) loam; many medium distinct yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) mottles; weak coarse prismatic structure; friable; neutral; abrupt smooth boundary.

IIC—47 to 60 inches; brown (7.5YR 5/4) strong brown (7.5YR 5/6) and light brown (7.5YR 6/4) loam; massive; friable; strong effervescence; moderately alkaline.

Thickness of loess ranges from 40 to 55 inches, and thickness of the solum and depth to free carbonates range from 44 to 60 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 to 6 and chroma of 2 to 4. It is 35 to 40 percent clay. Reaction is neutral or slightly acid. The IIB3 horizon is clay loam, loam, or silt loam. The IIC horizon has value of 5 or 6 and chroma of 2 to 4. Reaction is moderately alkaline or mildly alkaline.

Fox series

The Fox series consists of well drained soils on outwash plains, kamic moraines, and eskers. These soils are moderately deep to gravelly sand. They are moderately permeable in the solum and rapidly permeable in the underlying material. They formed in loamy outwash and are underlain by gravelly sand. Slopes range from 0 to 15 percent.

Fox soils are similar to Casco and Warsaw soils. Casco soils have a thinner solum and generally are more sloping than Fox soils. Warsaw soils have a mollic epipedon. Fox soils commonly adjoin Casco, Kane, and Will soils on the landscape. Kane soils are somewhat poorly drained, have a mollic epipedon, are less sloping, and are at lower elevations than Fox soils. Will soils are poorly drained, have a mollic epipedon, and are in drainageways and on flats at lower elevations.

Typical pedon of Fox silt loam, 5 to 10 percent slopes, 1,310 feet south and 120 feet west of the center of sec. 2, T. 41 N., R. 6 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

B21t—9 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; common thin brown to dark brown (10YR 4/3) organic coatings and clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—16 to 21 inches; brown to dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

IIB23t—21 to 26 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; continuous moderately thick brown to dark brown (7.5YR 4/2) organic coatings on faces of peds; few dolomitic pebbles; slightly acid; clear smooth boundary.

IIB24t—26 to 31 inches; brown to dark brown (7.5YR 4/4) sandy clay loam; moderate medium and coarse subangular blocky structure; firm; continuous moderately thick brown to dark brown (7.5YR 4/2) and dark brown (7.5YR 3/2) organic coatings on faces of peds and lining pores; common dolomitic pebbles; slightly acid; abrupt smooth boundary.

IIB3—31 to 34 inches; brown to dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; many moderately thick dark brown (7.5YR 3/2) and brown to dark brown (7.5YR 4/2) organic coatings as stains on grains; few dolomitic pebbles; mildly alkaline; abrupt smooth boundary.

IIC—34 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; many dolomitic pebbles; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 24 to 36 inches.

The A horizon ranges from 7 to 12 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is commonly silt loam, but the range includes loam and sandy loam. The IIB2t horizon is clay loam, sandy clay loam, or loam. The B2t and IIB2t horizons are 27 to 35 percent clay. Reaction is slightly acid or medium acid. They have value of 3 or 4 and chroma of 3 to 5. The IIC horizon has value of 4 to 6 and chroma of 3 or 4.

Harpster series

The Harpster series consists of deep, poorly drained, moderately permeable soils in depressions and drainageways on glacial moraines and outwash plains. These soils formed in calcareous, silty sediments derived from glacial till or outwash. Slopes range from 0 to 2 percent.

Harpster soils are similar to Canisteo and Drummer soils, and commonly adjoin Drummer soils on the landscape. Canisteo and Drummer soils lack calcic horizons. In addition, Canisteo soils have a coarser-textured solum.

Typical pedon of Harpster silty clay loam, 2,190 feet north and 400 feet west of the southeast corner of sec. 31, T. 39 N., R. 6 E.

Apca—0 to 9 inches; black (10YR 2/1) silty clay loam; weak fine granular structure; friable; 15 percent calcium carbonate; few snail shells; strong effervescence; moderately alkaline; clear smooth boundary.

A3ca—9 to 14 inches; black (10YR 2/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak fine subangular blocky structure parting to weak fine granular; firm; 15 percent calcium carbonate; few snail shells; slight effervescence; mildly alkaline; clear smooth boundary.

B21g—14 to 20 inches; gray (5Y 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium angular blocky structure; very firm; common thin dark gray (10YR 4/1) organic coatings on faces of peds; 7 percent calcium carbonate; few limestone pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

B22g—20 to 28 inches; gray to light gray (5Y 6/1) silty clay loam; common medium prominent brownish yellow (10YR 6/8) mottles; moderate fine prismatic structure; firm; few thin dark gray (10YR 4/1) organic coatings on faces of peds; few limestone pebbles; many snail shells; strong effervescence; moderately alkaline; gradual smooth boundary.

B3g—28 to 40 inches; gray to light gray (5Y 6/1) silt loam; common medium prominent brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; friable; dark gray (10YR 4/1) organic coatings in root channels; few limestone pebbles; many snail shells; strong effervescence; moderately alkaline; abrupt smooth boundary.

Cg—40 to 60 inches; grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) stratified silt loam and sandy loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 45 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches. The calcic horizon begins within 16 inches of the surface. It has a minimum thickness of 6 inches. The calcium carbonate equivalent of the calcic horizon ranges from 20 to 30 percent.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2g horizon has value of 4 to 6 and chroma of 1 or 2. Reaction is moderately alkaline or mildly alkaline. The B3g horizon is silt loam or silty clay loam. The Cg horizon has value of 4 to 6 and chroma of 1 or 2. It is stratified silt loam, loam, and sandy loam.

Harvard series

The Harvard series consists of deep, well drained and moderately well drained, moderately permeable soils on loess covered outwash plains. These soils formed in calcareous, silty loess and the underlying, stratified loamy outwash. Slopes range from 0 to 10 percent.

Harvard soils are similar to Camden and Proctor soils. Camden soils have a lighter colored surface layer. Proctor soils have a mollic epipedon. Harvard soils commonly adjoin Camden, Drummer, and Millbrook soils on the landscape. Drummer soils are poorly drained and are in depressions and drainageways. Millbrook soils are somewhat poorly drained and are in shallow depressions and adjacent to drainageways.

Typical pedon of Harvard silt loam, 2 to 5 percent slopes, 580 feet north and 1,405 feet east of the southwest corner of sec. 33, T. 41 N., R. 6 E.

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

B1t—8 to 12 inches; brown to dark brown (10YR 4/3) silty clay loam; weak very fine subangular blocky structure; firm; neutral; clear smooth boundary.

B21t—12 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

B22t—20 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint brown (7.5YR 5/4) mottles; moderate medium subangular blocky structure; firm; patchy thin brown to dark brown (10YR 4/3) organic clay coatings on faces of peds; neutral; abrupt smooth boundary.

IIB23t—29 to 36 inches; yellowish brown (10YR 5/4) clay loam; few fine faint brown (7.5YR 5/4) mottles; moderate coarse subangular blocky structure; firm; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

IIB3—36 to 41 inches; yellowish brown (10YR 5/4) clay loam; weak coarse subangular blocky structure; firm; neutral; clear smooth boundary.

IIC—41 to 60 inches; yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) stratified silt loam and sandy loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 40 to 60 inches.

The A horizon ranges from 7 to 12 inches in thickness. The A1 or Ap horizon has a value of 2 or 3 and chroma of 1 or 2. The A2 horizon, where present, has a value of 4 or 5 and chroma of 2 to 4. The B2t horizon has a value of 4 or 5 and chroma of 3 to 6. It is silty clay loam in the part that developed in loess and silt loam, loam, sandy loam, sandy clay loam, or clay loam in the part that developed in outwash. The B2t is 27 to 35 percent clay. Reaction is medium acid to neutral. The C horizon has a value of 5 or 6 and chroma of 3 to 6. It is mildly alkaline to moderately alkaline stratified loam, silt loam, or sandy loam.

Herbert series

The Herbert series consists of deep, somewhat poorly drained, moderately permeable soils that are near drainageways on uplands. They formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 0 to 3 percent.

Herbert soils are similar to Lisbon soils and commonly adjoin Dodge, Drummer, and Miami soils on the landscape. Lisbon soils have a mollic epipedon. Dodge and Miami soils are well drained and are more sloping than Herbert soils. In addition, Miami soils have a thinner loess cover. Drummer soils are poorly drained and have a mollic epipedon.

Typical pedon of Herbert silt loam, 300 feet south and 235 feet west of the center of sec. 22, T. 39 N., R. 7 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

A2—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam; very weak medium platy structure parting to weak medium subangular blocky; friable; common thin very dark gray (10YR 3/1) organic coatings on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B21t—12 to 19 inches; brown to dark brown (10YR 4/3) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many thin dark grayish brown (2.5Y 4/2) organic coatings and clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—19 to 27 inches; brown (10YR 5/3) silty clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate fine angular blocky structure; firm; many thin grayish brown (2.5Y 5/2) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

IIB23t—27 to 35 inches; brown (10YR 5/3) clay loam; many coarse faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; many thin grayish brown (2.5Y 5/2) clay films on faces of peds; common medium rounded dark accumulations (Fe and Mn oxides); few dolomitic pebbles; neutral; clear smooth boundary.

IIB3t—35 to 39 inches; yellowish brown (10YR 5/4) clay loam; many coarse distinct yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) mottles; very weak coarse subangular blocky structure; friable; common dolomitic pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—39 to 60 inches; light yellowish brown (10YR 6/4) loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) mottles; massive; friable; few medium light gray (10YR 7/1) lime accumulations; common dolomitic pebbles; strong effervescence; moderately alkaline.

The thickness of the loess ranges from 20 to 38 inches, and thickness of the solum and the depth to free carbonates range from 24 to 40 inches.

The A horizon ranges from 11 to 14 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The A2 horizon has value of 4 or 5 and chroma of 1 or 2. The B2t horizon, which formed in loess, is silty clay loam. The IIB2t horizon, which formed in glacial till, is clay loam. The B2t and IIB2t horizons have value of 4 or 5 and chroma of 2 to 6. They are 27 to 35 percent clay. Reaction is medium acid to neutral. The IIB3 horizon, where present, is light clay loam or heavy loam. The IIC horizon has value of 4 to 6 and chroma of 2 to 6. Reaction is moderately alkaline or mildly alkaline.

Houghton series

The Houghton series consists of deep, very poorly drained, rapidly permeable soils in depressions and bogs. These soils formed in herbaceous organic deposits. Slopes range from 0 to 2 percent.

Houghton soils are similar to Lena soils. Lena soils contain free carbonates at or near the surface. Houghton soils commonly adjoin Drummer and Will soils on the landscape. Drummer and Will soils formed mainly in mineral soil material and are at slightly higher elevations than Houghton soils.

Typical pedon of Houghton muck, 1,155 feet west and 800 feet north of the center of sec. 21, T. 41 N., R. 8 E.

Oa1—0 to 10 inches; black (10YR 2/1) broken face sapric material; weak very fine granular structure; very friable; neutral; clear smooth boundary.

Oa2—10 to 15 inches; black (10YR 2/1) broken face sapric material; weak very fine granular structure; very friable; neutral; clear smooth boundary.

Oa3—15 to 32 inches; black (10YR 2/1) broken face sapric material; weak very fine granular structure; very friable; neutral; abrupt smooth boundary.

Oa4—32 to 37 inches; black (10YR 2/1) broken face and very dark brown (7.5YR 2/2) rubbed sapric material; massive parting to weak fine granular structure; very friable; neutral; clear smooth boundary.

Oa5—37 to 49 inches; black (10YR 2/1) broken face sapric material with common dark brown (7.5YR 3/2) fibers; massive parting to weak fine granular structure; very friable; neutral; clear smooth boundary.

Oa6—49 to 65 inches; black (10YR 2/1) broken face sapric material and common dark brown (7.5YR 3/2) fibers; massive; very friable; neutral.

The organic layers are more than 51 inches thick and are primarily herbaceous. Some pedons contain woody fragments, which can not be crushed between the fingers.

Layers within the control section have value of 2 or 3 and chroma of 0 to 3. Reaction is slightly acid or neutral. The surface tier is dominantly sapric material but includes hemic material also. The subsurface tiers are dominantly sapric material. Hemic material in these tiers are less than 10 inches thick, and fiberic materials are less than 5 inches thick.

Kane series

The Kane series consists of somewhat poorly drained soils on outwash plains and terraces. These soils are moderately permeable in the solum and rapidly permeable in the underlying material. They are moderately deep to gravelly sand. They formed in loamy outwash and are underlain by gravelly sand. Slopes range from 0 to 3 percent.

Kane soils are similar to Brenton soils; however, Brenton soils contain less sand and gravel in the solum and underlying material. Kane soils commonly adjoin Dresden, Fox, and Warsaw soils on the landscape. Dresden and Fox soils are well drained, lack a mollic epipedon, and are on ridges and side slopes. Warsaw soils are well drained and are on ridgetops.

Typical pedon of Kane silt loam, 270 feet south and 880 feet east of the center of sec. 4, T. 42 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate fine granular structure; friable; neutral; clear smooth boundary.

A3—8 to 11 inches; very dark gray (10YR 3/1) loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

B21t—11 to 16 inches; dark grayish brown (2.5Y 4/2) clay loam; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine subangular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) organic coatings and clay films on faces of peds; neutral; clear smooth boundary.

B22t—16 to 22 inches; mixed dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) clay loam; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine and medium subangular blocky structure; firm; many thin dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.

B23t—22 to 28 inches; olive brown (2.5Y 4/4) clay loam; common fine distinct light olive brown (2.5Y 5/6) and dark grayish brown (2.5Y 4/2) mottles; weak medium subangular blocky structure; firm; neutral; abrupt smooth boundary.

IIB3—28 to 33 inches; grayish brown (2.5Y 5/2) sandy loam; common medium distinct olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; friable; common dolomitic pebbles of gravel and cobblestones; mildly alkaline; clear smooth boundary.

IIC—33 to 60 inches; grayish brown (2.5Y 5/2) gravelly sand; common medium distinct light olive brown (2.5Y 5/6) mottles; single grained; loose dolomitic pebbles of gravel and many cobblestones; moderately alkaline.

The thickness of the solum and the depth to sand and gravel range from 24 to 40 inches. Thickness of the mollic epipedon ranges from 10 to 14 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is commonly silt loam, but includes loam and sandy loam. The B2t horizon has value of 4 to 6 and chroma of 2 to 4, and has distinct mottles. It is clay loam or sandy clay loam that is 27 to 35 percent clay. Reaction is slightly acid to mildly alkaline. The IIC horizon is gravelly sand. Reaction is moderately alkaline. It has value of 4 to 6 and chroma of 2 to 6.

Kidder series

The Kidder series consists of deep, well drained soils on loess covered end moraines. These soils are moderately permeable in the solum and moderately rapidly permeable in the underlying material. They formed in a thin layer of calcareous, silty loess and the underlying sandy loam till. Slopes range from 2 to 15 percent.

Kidder soils are similar to Fox and Miami soils and commonly adjoin Fox, Miami, and Rush soils on the landscape. Fox and Rush soils have more coarse sand and gravel in the underlying material than Kidder soils. Miami soils have a lower content of sand and gravel in the underlying material.

Typical pedon of Kidder silt loam, 2 to 5 percent slopes, 1,330 feet west and 360 feet north of the center of sec. 1, T. 42 N., R. 8 E.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; very friable; slightly acid; abrupt smooth boundary.

B21t—8 to 17 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate fine subangular blocky structure; firm; few dolomitic pebbles; medium acid; clear smooth boundary.

B22t—17 to 28 inches; brown to dark brown (7.5YR 4/4) clay loam; weak medium prismatic structure parting to weak medium subangular blocky; firm; continuous thick brown to dark brown (7.5YR 4/2) organic clay films on faces of peds; common medium irregular dark accumulations (Fe and Mn oxides); common dolomitic pebbles; slightly acid; clear smooth boundary.

B3t—28 to 39 inches; light yellowish brown (10YR 6/4) sandy loam; few coarse distinct yellowish red (5YR 5/8) mottles; very weak coarse subangular blocky structure; friable; common moderately thick brown to dark brown (7.5YR 4/2) organic coatings lining pores; many dolomitic stones and pebbles; strong effervescence; moderately alkaline; gradual wavy boundary.

C—39 to 60 inches; light yellowish brown (10YR 6/4) sandy loam; massive; friable; many dolomitic stones and pebbles; strong effervescence; moderately alkaline.

The thickness of the solum and depth to free carbonates range from 24 to 40 inches. The solum is more than 15 percent, by volume, coarse fragments.

The A horizon ranges from 6 to 11 inches in thickness. The Ap horizon a value of 3 or 4 and chroma of 2 or 3. It is dominantly silt loam, but the ranges include loam, fine sandy loam, or sandy loam. The A2 horizon, where present, is less than 5 inches thick. It has a value of 4 or 5 and chroma of 2 or 3 and is loam, silt loam, or sandy loam. The B2t horizon has a value of 3 or 4 and chroma of 3 or 4. It is loam, sandy clay loam, or clay loam that is 20 to 30 percent clay. The B3t horizon has value of 4 to 6 and chroma of 3 to 5. It is medium acid to mildly alkaline loam or sandy loam. The C horizon has value of 5 or 6 and chroma of 3 to 6. It is mildly alkaline or moderately alkaline.

La Rose series

The La Rose series consists of deep, well drained and moderately well drained soils on end moraines. These soils formed in calcareous, loam till. Slopes range from 5 to 15 percent.

La Rose soils are similar to Octagon soils. Octagon soils lack a mollic epipedon and have a thicker solum. La Rose soils commonly adjoin Lisbon and Saybrook soils on the landscape. Lisbon soils have a thicker solum and are in shallow depressions. Saybrook soils have a thicker solum and are less sloping than La Rose soils.

Typical pedon of La Rose loam, 10 to 15 percent slopes, eroded, 265 feet south and 1,550 feet east of the center of sec. 36, T. 40 N., R. 7 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam; weak very fine granular structure; friable; neutral; abrupt smooth boundary.

B21t—7 to 14 inches; brown to dark brown (10YR 4/3) clay loam; weak fine subangular blocky structure; firm; continuous thin dark brown (10YR 3/3) organic coatings and clay films on faces of peds; few dolomitic stones; neutral; clear smooth boundary.

B22t—14 to 20 inches; brown to dark brown (10YR 4/3) clay loam; weak fine and medium subangular blocky structure; firm; few dolomitic cobbles; slight effervescence; mildly alkaline; abrupt smooth boundary.

C—20 to 60 inches; yellowish brown (10YR 5/4) loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 10 to 24 inches. Thickness of the mollic epipedon ranges from 6 to 15 inches.

The A horizon has value of 2 or 3 and chroma of 2. It is dominantly loam, but includes silt loam. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. It is clay loam or heavy loam that is 27 to 35 percent clay. Reaction is medium acid to mildly alkaline. The C horizon has value of 4 to 6 and chroma of 3 or 4.

Lena series

The Lena series consists of deep, very poorly drained, moderately rapidly permeable soils in depressions and bogs. These soils formed in herbaceous organic deposits. Slopes range from 0 to 2 percent.

Lena soils are similar to Houghton soils. Houghton soils lack free carbonates in the upper tiers. Lena soils commonly adjoin Canisteo, Drummer, and Harpster soils on the landscape. Canisteo, Drummer, and Harpster soils formed mainly in mineral soil material, have a thinner, dark colored surface horizon, and are at slightly higher elevations than Lena soils.

Typical pedon of Lena muck, 210 feet south and 1,570 feet east of the center of sec. 8, T. 42 N., R. 6 E.

Oa1—0 to 11 inches; black (N 2/0) broken face and rubbed sapric material; weak medium granular structure; friable; common snail shell fragments; strong effervescence; moderately alkaline; clear smooth boundary.

Oa2—11 to 19 inches; black (N 2/0) broken face and rubbed sapric material; 5 percent fibers; weak medium granular structure; very friable; few snail shell fragments; strong effervescence; moderately alkaline; gradual smooth boundary.

Oa3—19 to 30 inches; black (N 2/0) broken face and dark reddish brown (5YR 2/2) rubbed sapric material; 15 to 20 percent fibers; massive parting to weak medium subangular blocky; very friable; few snail shells; strong effervescence; moderately alkaline; gradual smooth boundary.

Oa4—30 to 38 inches; black (10YR 2/1) broken face and dark reddish brown (5YR 2/2) rubbed sapric material; 15 percent fibers; massive parting to weak coarse subangular blocky; friable; few lime accumulations; strong effervescence; moderately alkaline; gradual smooth boundary.

Oa5—38 to 55 inches; black (10YR 2/1) broken face and dark reddish brown (5YR 2/2) rubbed sapric material; 15 percent fibers; massive; friable; few lime accumulations; about 5 percent gray to light gray (10YR 6/1) limnic material; strong effervescence; moderately alkaline; clear smooth boundary.

Oa6—55 to 60 inches; black (10YR 2/1) broken face and very dark brown (10YR 2/2) rubbed sapric material; 10 percent fibers; massive; very friable; common lime accumulations; about 20 percent gray to light gray (10YR 6/1) limnic material; violent effervescence; moderately alkaline.

The organic layers are more than 51 inches thick and are primarily herbaceous. In some pedons hemic layers have a higher value or chroma in the control section.

Layers within the control section have value of 2 or 3 and chroma of 0 to 3. Reaction is moderately alkaline in most tiers, but some are mildly alkaline. Hemic or fibric materials in the subsurface tiers have a total thickness of less than 5 inches. Layers within the control section have strong or violent effervescence.

Lisbon series

The Lisbon series consists of deep, moderately permeable, somewhat poorly drained soils on knolls and in shallow depressions on till plains. These soils formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 0 to 3 percent.

Lisbon soils are similar to Herbert soils. Herbert soils lack mollic epipedons. Lisbon soils commonly adjoin Drummer and Saybrook soils on the landscape. Drummer soils are poorly drained and are on flats and in depressions of uplands. Saybrook soils are well drained and moderately well drained and are at higher elevations than Lisbon soils.

Typical pedon of Lisbon silt loam, 870 feet north and 250 feet west of the center of sec 15, T. 39 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A12—8 to 13 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

B1t—13 to 19 inches; brown to dark brown (10YR 4/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common thin dark grayish brown (10YR 4/2) and patchy thin very dark gray (10YR 3/1) organic coatings on faces of peds and as stains on grains; neutral; clear smooth boundary.

B21t—19 to 26 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common thin grayish brown (10YR 5/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—26 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light olive brown (2.5Y 5/6) and grayish brown (2.5Y 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common moderately thick grayish brown (10YR 5/2) clay films on faces of peds and patchy thin very dark grayish brown (10YR 3/2) organic coatings as stains on faces of peds; neutral; abrupt smooth boundary.

IIB23t—31 to 36 inches; brown (10YR 5/3) clay loam; few fine distinct dark grayish brown (10YR 4/2) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; discontinuous moderately thick very dark grayish brown (10YR 3/2) organic coatings and clay films on faces of peds; few dolomitic pebbles; neutral; clear smooth boundary.

IIB3—36 to 39 inches; yellowish brown (10YR 5/4) loam; common fine distinct yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) mottles; weak coarse subangular blocky structure; firm; few thin very dark grayish brown (10YR 3/2) organic coatings lining pores; few dolomitic pebbles; slight effervescence; mildly alkaline; abrupt smooth boundary.

IIC—39 to 60 inches; light yellowish brown (10YR 6/4) loam; common medium distinct brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) mottles; massive; friable; few fine light gray (10YR 7/1) lime accumulations; common dolomitic pebbles; strong effervescence; moderately alkaline.

Thickness of the loess mantle ranges from 20 to 40 inches, and thickness of the solum and depth to free carbonates range from 22 to 40 inches. Thickness of the mollic epipedon ranges from 10 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The IIB2t horizon, formed in glacial till, is clay loam. The B2t and IIB2t horizons have value of 4 or 5 and chroma of 2 to 6, and is mottled. They are 27 to 35 percent clay. Reaction is medium acid to neutral in the upper part and slightly acid to moderately alkaline in the lower part. The IIB3 horizon, where present, is heavy loam or light clay loam. The IIC horizon has value of 4 to 6 and chroma of 2 to 6. Reaction is mildly alkaline or moderately alkaline.

Lorenzo series

The Lorenzo series consists of well drained soils on outwash plains and terraces. These soils are moderately rapidly permeable in the solum and rapidly permeable in the underlying material. They formed in a thin layer of loamy outwash and are underlain by calcareous sand and gravel. Slopes range from 0 to 10 percent.

Lorenzo soils are similar to Casco and Warsaw soils. Casco soils lack mollic epipedons. Lorenzo soils commonly adjoin Kane, Warsaw, and Will soils. Kane soils are somewhat poorly drained and are at lower elevations than Lorenzo soils. Warsaw soils have a thicker solum and typically are less sloping than Lorenzo soils. Will soils are poorly drained and are also at lower elevations than Lorenzo soils.

Typical pedon of Lorenzo loam, 0 to 2 percent slopes, 650 feet north and 1,230 feet east of the center of sec. 4, T. 42 N., R. 6 E.

Ap—0 to 8 inches; very dark brown (10YR 2/2) loam; weak very fine granular structure; very friable; neutral; abrupt smooth boundary.

A3—8 to 13 inches; very dark grayish brown (10YR 3/2) loam; weak very fine granular structure; friable; neutral; clear smooth boundary.

Bt—13 to 21 inches; brown to dark brown (10YR 4/3) loam; weak fine subangular blocky structure; patchy thin very dark brown (10YR 3/2) clay films on faces of peds; friable; neutral; abrupt smooth boundary.

IIC—21 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum and depth to carbonates range from 12 to 24 inches. Thickness of the mollic epipedon ranges from 7 to 13 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly loam, but includes sandy loam and silt loam. The Bt horizon has value of 4 or 5 and chroma of 3 or 4. It is loam, clay loam, gravelly clay loam, or sandy clay loam that is 27 to 35 percent clay. The IIC horizon has value of 4 or 5 and chroma of 3 or 4.

Markham series

The Markham series consists of deep, well drained and moderately well drained, moderately slowly permeable and slowly permeable soils on end moraines. These soils formed in a thin layer of calcareous, silty material and the underlying silty clay loam till. Slopes range from 2 to 10 percent.

Markham soils are similar to Morley and Varna soils. Morley soils have a lighter colored surface horizon. Varna soils have a mollic epipedon. Markham soils commonly adjoin Beecher and Milford soils on the landscape. Beecher soils are somewhat poorly drained and are in shallow depressions. Milford soils are poorly drained, have a mollic epipedon, and are in swales and drainageways.

Typical pedon of Markham silt loam, 2 to 5 percent slopes, 740 feet south and 410 feet east of the northwest corner of sec. 13, T. 39 N., R. 8 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

IIB21t—7 to 13 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine angular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

IIB22t—13 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine and medium prismatic structure parting to moderate medium angular blocky; firm; common moderately thick brown to dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

IIB23t—19 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; moderate coarse subangular blocky structure; firm; patchy thin brown (10YR 5/3) clay films on faces of peds; few limestone pebbles; neutral; clear smooth boundary.

IIB3—24 to 31 inches; light yellowish brown (10YR 6/4) silty clay loam; few fine faint brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; firm; few limestone pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—31 to 60 inches; light yellowish brown (10YR 6/4) silty clay loam; few fine faint brownish yellow (10YR 6/6) mottles; massive; friable; few medium limestone pebbles; strong effervescence; moderately alkaline.

Thickness of the silty mantle is less than 18 inches thick, and thickness of the solum and depth to free carbonates range from 20 to 48 inches.

The Ap horizon is 7 to 10 inches thick. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The IIB2t horizon is silty clay loam or silty clay in the upper part and silty clay loam in the lower part. It is 35 to 42 percent clay. It has value of 4 or 5 and chroma of 3 or 4. Reaction is medium acid to neutral. The IIC horizon has value of 4 to 6 and chroma of 3 to 6.

Martinsville series

The Martinsville series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in calcareous, stratified sands and silts. Slopes range from 2 to 10 percent.

Martinsville soils are similar to Camden and Fox soils, and commonly adjoin Camden, Fox, and Selma soils on the landscape. Camden soils contain less sand in the upper solum than Martinsville soils. Fox soils are underlain by gravel. The poorly drained Selma soils have a thicker mollic epipedon and are on flats and in drainageways at lower elevations than Martinsville soils.

Typical pedon of Martinsville loam, 5 to 10 percent slopes, 175 feet south and 2,560 feet east of the northwest corner of sec. 15, T. 42 N., R. 7 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; neutral; abrupt smooth boundary.

A2—9 to 14 inches; brown (7.5YR 5/4) loam; moderate thick platy structure; friable; neutral; abrupt smooth boundary.

B21t—14 to 23 inches; brown (7.5YR 5/4) clay loam; moderate fine subangular blocky structure; firm; continuous moderately thick dark brown (7.5YR 4/4) clay films on faces of peds; common thin silica coats on faces of peds; medium acid; clear smooth boundary.

B22t—23 to 29 inches; brown (7.5YR 5/4) clay loam; moderate medium subangular blocky structure; firm; continuous moderately thick dark brown (7.5YR 4/4) clay films on faces of peds; common thin silica coats on faces of peds; few medium irregular dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B23t—29 to 42 inches; brown to dark brown (7.5YR 4/4) sandy clay loam; few coarse distinct strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; firm; many moderately thick reddish brown (5YR 4/3) organic clay films on faces of peds; many large irregular dark accumulations (Fe and Mn oxides); few dolomitic pebbles; medium acid; clear smooth boundary.

B3t—42 to 59 inches; brown (7.5YR 5/4) and light yellowish brown (10YR 6/4) stratified silt loam and sandy loam; few coarse distinct yellowish brown (10YR 5/8) and yellowish red (5YR 5/8) mottles; weak very coarse subangular blocky structure; friable; common thin brown to dark brown (7.5YR 4/4) organic clay films on faces of peds; few medium irregular dark accumulations (Fe and Mn oxides); neutral; gradual smooth boundary.

C—59 to 70 inches; yellowish brown (10YR 5/4) sandy loam; few fine distinct yellowish red (5YR 5/8) mottles; massive; friable; common dolomitic pebbles; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 36 to 60 inches. The A horizon ranges from 6 to 17 inches in thickness. The Ap and A2 horizons have a value of 4 or 5 and chroma of 2 through 4. They are commonly loam, but the range includes silt loam, fine sandy loam, and sandy loam. The B2t horizon has a value of 4 through 6 and chroma of 3 through 6. It is commonly clay loam, but in some pedons, subhorizons are loam, sandy clay loam, silty clay loam, or sandy loam. The B2t horizon averages between 20 and 35 percent clay. Reaction is medium acid to strongly acid. The C horizon has value of 5 and chroma of 3 or 4. It consists of stratified layers of loam, sandy clay loam, sandy loam, silt loam, or sand and is moderately alkaline.

Miami series

The Miami series consists of deep, well drained, moderately permeable soils on end moraines. These soils formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 2 to 20 percent.

Miami soils are similar to Dodge soil and commonly adjoin Dodge, Drummer, and Herbert soils on the landscape. Dodge soils have a thicker cover of loess than Miami soils. The poorly drained Drummer soils have a mollic epipedon and are on upland flats and in depressions. The somewhat poorly drained Herbert soils have a thicker loess cover and are in shallow depressions.

Typical pedon of Miami silt loam, 2 to 5 percent slopes, 90 feet north and 2,145 feet west of the southeast corner of sec. 29, T. 41 N., R. 7 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; weak very fine granular structure; friable; neutral; abrupt smooth boundary.

A2—4 to 11 inches; brown (10YR 5/3) silt loam; weak thick platy structure; friable; neutral; abrupt smooth boundary.

IIB21t—11 to 15 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate very fine and fine angular blocky structure; firm; medium acid; clear smooth boundary.

IIB22t—15 to 21 inches; reddish brown (5YR 4/4) clay loam; moderate fine angular blocky structure; firm; discontinuous dark reddish brown (5YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB23t—21 to 29 inches; reddish brown (5YR 4/4) clay loam; moderate medium angular blocky structure; firm; discontinuous dark reddish brown (5YR 3/3) clay films on faces of peds; slightly acid; gradual smooth boundary.

IIB3—29 to 39 inches; reddish brown (5YR 4/4) clay loam; weak medium and coarse subangular blocky structure; friable; mildly alkaline; abrupt smooth boundary.

IIC—39 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the loess is less than 18 inches, and thickness of the solum ranges from 24 to 42 inches. Depth to carbonates ranges from 20 to 38 inches.

The A horizon ranges from 7 to 12 inches in thickness. Many pedons lack an A2 horizon in cultivated areas. The A1 horizon has value of 3 and chroma of 1 or 2. Ap horizons have value of 5 to 3 and chroma of 2 to 4. The A2 horizon has value of 4 or 5 and chroma of 2 to 4. The IIB2t horizon, which formed in glacial till, is clay loam. It has hue of 10YR, 7.5YR, and 5YR; value of 4 or 5; and chroma of 3 or 4. It is 27 to 35 percent clay. Reaction is medium acid or slightly acid. The IIB3 horizon is clay loam or loam. The IIC horizon has value of 5 or 6 and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Milford series

The Milford series consists of deep, poorly drained, moderately slowly permeable soils on flats and in drainageways of uplands. These soils formed in silty and loamy sediments derived from glacial drift. Slopes range from 0 to 2 percent.

Milford soils are similar to Drummer soils. Drummer soils contain less clay in the solum than Milford soils. Milford soils commonly adjoin Beecher, Elliott, Markham, and Morley soils on the landscape. Beecher and Elliott soils are somewhat poorly drained and are more sloping than Milford soils. Markham and Morley soils lack a mollic epipedon and are on ridges at higher elevations than Milford soils.

Typical pedon of Milford silty clay loam, 750 feet north and 1,950 feet west of the center of sec. 36, T. 39 N., R. 8 E.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A12—9 to 15 inches; black (10YR 2/1) silty clay loam; few fine distinct light olive brown (2.5Y 5/4) mottles; moderate fine subangular blocky structure; firm; neutral; clear smooth boundary.

B1g—15 to 20 inches; very dark gray (10YR 3/1) silty clay; few fine distinct light olive brown (2.5Y 5/4) mottles; moderate fine and medium angular blocky structure; very firm; common thin black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

B21g—20 to 29 inches; dark gray (5Y 4/1) silty clay; common medium distinct light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; very firm; common thin dark olive gray (5Y 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

B22g—29 to 38 inches; gray (5Y 5/1) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) and prominent yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium and coarse angular blocky; very firm; common thin dark gray (5Y 4/1) organic coatings on faces of peds and very dark gray (10YR 3/1) organic matter in krotovina; neutral; clear smooth boundary.

B23g—38 to 47 inches; olive gray (5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; patchy thin olive gray (5Y 4/2) organic coatings on faces of peds and dark olive gray (5Y 3/2) organic matter in krotovina; neutral; clear smooth boundary.

B3g—47 to 53 inches; gray to light gray (5Y 6/1) silty clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; neutral; clear smooth boundary.

Cg—53 to 60 inches; gray to light gray (5Y 6/1) silty clay loam; common medium distinct light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/8) mottles; massive; friable; neutral.

The solum thickness ranges from 36 to 60 inches. Thickness of the mollic epipedon ranges from 10 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B1g horizon, where present, is light silty clay or heavy silty clay loam. The B2g horizon has values of 4 to 6 and chroma of 1 or 2. Mottles are common or many, and distinct or prominent. The B2g horizon is silty clay or silty clay loam that is 35 to 42 percent clay. Reaction is neutral or slightly acid. The B3g horizon, where present, is silty clay loam. The Cg horizon has value of 4 to 6 and chroma of 1 or 2. It is silty clay loam or clay loam. Reaction is neutral or mildly alkaline.

Millbrook series

The Millbrook series consists of deep, somewhat poorly drained, moderately permeable soils on flats near drainageways on uplands. These soils formed in calcareous, silty loess and the underlying, stratified loamy outwash. Slopes range from 0 to 3 percent.

Millbrook soils are similar to Brenton and Virgil soils. Brenton soils have a mollic epipedon. Virgil soils have a thicker loess cover than Millbrook soils and contain less sand to a depth of 40 inches. Millbrook soils commonly adjoin Camden, Drummer, and Harvard soils on the landscape. Camden and Harvard soils are well drained and moderately well drained, and are more sloping than Millbrook soils. Drummer soils are poorly drained and are in drainageways at lower elevations than Millbrook soils.

Typical pedon of Millbrook silt loam, 970 feet east and 175 feet south of the northwest corner of sec. 16, T. 38 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A2—8 to 12 inches; grayish brown (10YR 5/2) silt loam; weak fine platy structure parting to weak fine granular; friable; slightly acid; clear smooth boundary.

B21t—12 to 17 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common thin dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B22t—17 to 23 inches; brown (10YR 5/3) silty clay loam; common fine distinct light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds; few medium distinct dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B23t—23 to 29 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; patchy thin dark grayish brown (10YR 4/2) clay films on faces of peds; common medium dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

IIB24t—29 to 35 inches; light olive brown (2.5Y 5/4) sandy clay loam; many medium distinct grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few thin dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB3—35 to 43 inches; light olive brown (2.5Y 5/4) sandy loam; many coarse distinct grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; slightly acid; gradual smooth boundary.

IIC—43 to 60 inches; light olive brown (2.5Y 5/4) stratified sandy loam and loamy sand; many coarse distinct brownish yellow (10YR 6/8) and grayish brown (2.5Y 5/2) mottles; massive; friable; neutral.

Thickness of loess ranges from 24 to 36 inches, and thickness of the solum and the depth to free carbonates range from 40 to 60 inches.

The A horizon ranges from 7 to 13 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 5 or 6 and chroma of 2. The IIB2t horizon is sandy clay loam, sandy loam, loam, or clay loam. The B2t and IIB2t horizons have value of 4 or 5 and chroma of 2 to 4 and are distinctly mottled. They are 27 to 35 percent clay. The IIC horizon has value of 4 to 6 and chroma of 2 to 4. It is stratified sandy loam, loam, or silt loam. Reaction is neutral to moderately alkaline.

Millington series

The Millington series consists of deep, poorly drained, moderately permeable soils that are nearly level on flood plains. These soils formed in stratified alluvium derived principally from Mollisols that formed in glacial drift and loess. Slopes range from 0 to 2 percent.

Millington soils are similar to Otter soils and commonly adjoin Drummer and Otter soils on the landscape. Drummer soils have a mollic epipedon less than 24 inches thick. Otter soils are not calcareous.

Typical pedon of Millington loam, 990 feet west and 500 feet south of the northeast corner of sec. 19, T. 39 N., R. 8 E.

A11—0 to 17 inches; black (10YR 2/1) loam; weak medium subangular blocky structure; friable; sand grains present on faces of peds; slight effervescence; mildly alkaline; gradual smooth boundary.

A12—17 to 28 inches; black (10YR 2/1) silty clay loam; few fine distinct brown (7.5YR 5/4) mottles; moderate medium subangular blocky structure; firm; slight effervescence; mildly alkaline; abrupt smooth boundary.

B2—28 to 42 inches; very dark gray (10YR 3/1) and black (10YR 2/1) stratified sandy loam and silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate very coarse subangular blocky structure; firm; sand lenses throughout; slight effervescence; mildly alkaline; abrupt smooth boundary.

C—42 to 60 inches; stratified dark grayish brown (10YR 4/2) and light gray (10YR 7/2) sandy loam and gravelly loam; single grained; very friable; strong effervescence; mildly alkaline.

The thickness of the mollic epipedon ranges from 24 to 42 inches. The A and B horizons have value of 2 or 3 and chroma of 1 or 2. They are dominantly loam, but the range includes silt loam, silty clay loam, and clay loam. The 10 to 40 inch control section is 18 to 35 percent clay. Any increase of clay in the B horizon is caused by stratification and not translocation. Reaction is mildly alkaline or moderately alkaline. The C horizon has a value of 3 through 7 and chroma of 1 or 2. It is mildly or moderately alkaline.

Morley series

The Morley series consists of deep, well drained and moderately well drained, moderately slowly permeable and slowly permeable soils on end moraines. These soils formed in a thin layer of calcareous, silty material and the underlying silty clay loam till. Slopes range from 2 to 20 percent.

Morley soils are similar to Markham and Varna soils. Varna soils have a mollic epipedon. Morley soils commonly adjoin Beecher, Markham, and Milford soils on the landscape. Beecher soils are somewhat poorly drained and are in shallow depressions near drainageways. Markham soils have a thicker dark colored surface layer than Morley soils. Milford soils are poorly drained, have a mollic epipedon, and are in depressions and drainageways.

Typical pedon of Morley silt loam, 2 to 5 percent slopes, 1,485 feet north and 670 feet west of the southeast corner of sec. 10, T. 39 N., R. 8 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many medium roots; neutral; abrupt smooth boundary.

A2—4 to 10 inches; brown (10YR 5/3) silt loam; moderate very thin platy structure; very friable; very dark brown (10YR 2/2) krotovina; common coarse horizontal roots; medium acid; abrupt smooth boundary.

IIB21t—10 to 16 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine angular blocky structure; firm; many thin pale brown (10YR 6/3) silica coats on faces of peds; continuous moderately thick very dark grayish brown (10YR 3/2) organic coatings and clay films on faces of peds; common very fine vertical roots; medium acid; abrupt smooth boundary.

IIB22t—16 to 22 inches; brown to dark brown (10YR 4/3) silty clay; few fine distinct strong brown (7.5YR 5/6) mottles; strong medium subangular blocky structure; very firm; continuous thick dark brown (10YR 3/3) organic coatings and clay films on faces of peds; few medium rounded dark accumulations (Fe and Mn oxides); common very fine roots; few sand grains; slightly acid; clear smooth boundary.

IIB31t—22 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm; few thin dark yellowish brown (10YR 4/4) clay films on faces of peds and very dark brown (10YR 2/2) organic coatings lining pores; common large rounded dark accumulations (Fe and Mn oxides); few very fine vertical roots; common fine limestone pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

IIB32—28 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; very firm; few thin very dark brown (10YR 2/2) organic coatings lining pores; common large rounded dark accumulations (Fe and Mn oxides); common shale fragments and limestone pebbles; slight effervescence; mildly alkaline; gradual smooth boundary.

IIC—43 to 60 inches; light yellowish brown (10YR 6/4) silty clay loam; many medium distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles; massive; very firm; common large rounded dark accumulations (Fe and Mn oxides); common shale fragments and limestone pebbles; strong effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 20 to 48 inches. The A horizon ranges from 8 to 13 inches in thickness. The A1 horizon has a value of 2 or 3 and chroma of 1 or 2. It is as much as 4 inches thick. The A2 horizon has a value of 4 or 5 and chroma of 1 through 3. The B2t horizon has value of 4 through 6 and chroma of 3 or 4. It is silty clay loam or silty clay that is 35 to 45 percent clay. Reaction is strongly acid to slightly acid. The C horizon has value of 5 or 6 and chroma of 4 through 8. It is mildly alkaline or moderately alkaline.

Mundelein series

The Mundelein series consists of deep, somewhat poorly drained, moderately permeable soils on flats and in shallow depressions of uplands. These soils formed in calcareous, silty material and the underlying, stratified loamy outwash.

Mundelein soils are similar to Brenton and Wauconda soils. Brenton soils have a thicker solum than Mundelein. Wauconda soils lack a mollic epipedon. Mundelein soils commonly adjoin Drummer and Zurich soils on the landscape. Drummer soils are poorly drained and are at lower elevations than Mundelein soils. Zurich soils are well drained and moderately well drained, and are more sloping.

Typical pedon of Mundelein silt loam, 120 feet south and 1,640 feet west of the northeast corner of sec. 17, T. 38 N., R. 8 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 12 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

B1t—12 to 15 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; patchy thin very dark gray (10YR 3/1) organic coatings and clay films on faces of peds; very few fine dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B21t—15 to 21 inches; brown to dark brown (10YR 4/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common thin dark grayish brown (10YR 4/2) organic coatings and clay films on faces of peds; few fine dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B22t—21 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; patchy thin dark grayish brown (10YR 4/2) organic coatings and clay films on faces of peds; common fine dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

IIB3—28 to 35 inches; mixed olive brown (2.5Y 4/4) and dark grayish brown (10YR 4/2) silt loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; firm; common medium dark accumulations (Fe and Mn Oxides); few dolomitic pebbles; slight effervescence; mildly alkaline; abrupt smooth boundary.

IIC—35 to 60 inches; mixed light brownish gray (2.5Y 6/2) light olive brown (2.5Y 5/6) and yellowish brown (10YR 5/8) stratified silt loam and sandy loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the silty mantle ranges from 20 to 40 inches, and thickness of the solum and depth to carbonates range from 24 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches. The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 2 to 4, and is distinctly mottled. Reaction is medium acid to mildly alkaline. The IIB3 horizon is silt loam, sandy loam, or loam. The IIC horizon has value of 5 or 6 and chroma of 1 or 2. It is moderately alkaline, stratified silt loam, sandy loam, or loam.

Octagon series

The Octagon series consists of deep, well drained, moderately permeable soils on end moraines. These soils formed in a thin layer of calcareous loess and the calcareous, underlying loamy till. Slopes range from 2 to 15 percent.

Octagon soils are similar to Miami soils. Miami soils have a lighter colored surface horizon. Octagon soils commonly adjoin Drummer, Herbert, and Miami soils on the landscape. Drummer soils are poorly drained, have a mollic epipedon, and are in drainageways and depressions. Herbert soils are somewhat poorly drained and are in shallow depressions.

Typical pedon of Octagon silt loam, 2 to 5 percent slopes, 1,900 feet east and 70 feet north of the southwest corner of sec. 18, T. 41 N., R. 7 E.

Ap—0 to 7 inches; very dark brown (10YR 2/2) silt loam; weak very fine granular structure; friable; neutral; abrupt smooth boundary.

B1—7 to 13 inches; brown to dark brown (10YR 4/3) silt loam; weak very fine granular structure; friable; slightly acid; clear smooth boundary.

IIB21t—13 to 25 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate fine subangular blocky structure; friable; continuous dark brown (7.5YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

IIB22t—25 to 30 inches; brown (7.5YR 5/4) clay loam; weak fine subangular blocky structure; few thin dark brown (7.5YR 3/2) clay films on faces of peds; friable; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—30 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; strong effervescence; moderately alkaline.

Thickness of the loess is less than 18 inches, and thickness of the solum and depth to free carbonates range from 24 to 42 inches.

The A horizon ranges from 6 to 12 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 to 3. The IIB2t horizon has value of 4 or 5 and chroma of 3 or 4. It is 27 to 35 percent clay. Reaction is neutral or slightly acid in the upper part and neutral or mildly alkaline in the lower part. The IIC horizon has value of 5 or 6 and chroma of 3 or 4.

Otter series

The Otter series consists of deep, poorly drained, moderately permeable soils on bottom lands along the major streams. These soils formed in alluvial material. Slopes range from 0 to 2 percent.

Otter soils are similar to Canisteo and Millington soils. Canisteo and Millington soils are fine-textured loams that contain free carbonates at or near the surface. Otter soils commonly adjoin Miami, Morley, and Rodman soils. Miami, Morley, and Rodman soils are more sloping and are on ridges and side slopes at higher elevations than Otter soils.

Typical pedon of Otter silt loam, 570 feet north and 1,980 feet west of the southeast corner of sec. 9, T. 38 N., R. 7 E.

A11—0 to 18 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A12—18 to 28 inches; black (10YR 2/1) silt loam; weak medium subangular blocky structure; friable; neutral; clear smooth boundary.

B2g—28 to 39 inches; dark grayish brown (2.5Y 4/2) silt loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; moderately thick very dark gray (10YR 3/1) organic coatings as stains on faces of peds; neutral; clear smooth boundary.

C1g—39 to 50 inches; dark gray (5Y 4/1) silt loam; few fine distinct light olive brown (2.5Y 5/6) mottles; massive; friable; slight effervescence; mildly alkaline; gradual smooth boundary.

C2g—50 to 60 inches; gray (5Y 5/1) loam; common fine distinct light olive brown (2.5Y 5/6) mottles; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches. Thickness of the mollic epipedon also ranges from 24 to 40 inches.

The A horizon has value of 2 or 3 and chroma of 0 or 1. The B2g horizon has value of 2 to 4 and chroma of 1 or 2, and is distinctly mottled. Reaction is neutral or mildly alkaline. The Cg horizon has value of 4 or 5 and chroma of 1 or 2, and distinct mottles. Reaction is mildly alkaline or moderately alkaline. It is silt loam or loam, but ranges include strata of sandy loam and silty clay loam. The control section averages between 18 and 27 percent clay.

Peotone series

The Peotone series consists of deep, very poorly drained, moderately slowly permeable soils in depressions. These soils formed in silty sediments. Slopes range from 0 to 2 percent.

Peotone soils are similar to Milford and Otter soils. Otter soils contain less clay than Peotone soils. Peotone soils commonly adjoin Drummer and Milford soils on the landscape. Drummer soils contain less clay in the solum and have a thinner mollic epipedon. Milford soils have a thinner mollic epipedon and are at higher elevations than Peotone soils.

Typical pedon of Peotone silty clay loam, 320 feet south and 1,445 feet west of the center of sec. 28, T. 41 N., R. 8 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; weak medium granular structure; firm; slightly acid; abrupt smooth boundary.

A3—8 to 14 inches; black (10YR 2/1) silty clay loam; moderate fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B21—14 to 22 inches; black (10YR 2/1) silty clay loam; moderate medium subangular blocky structure; firm; slightly acid; clear smooth boundary.

B22—22 to 27 inches; very dark gray (10YR 3/1) silty clay loam; few fine distinct grayish brown (2.5Y 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common thin black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B23g—27 to 36 inches; dark gray (5Y 4/1) and olive gray (5Y 4/2) silty clay loam; common fine distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common thin very dark gray (10YR 3/1) organic coatings and stains on faces of peds; neutral; clear smooth boundary.

B31g—36 to 45 inches; olive brown (5Y 4/2) and dark gray (5Y 4/1) silty clay loam; common medium distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; few dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B32g—45 to 53 inches; olive gray (5Y 4/2) and gray (5Y 5/1) silty clay loam; many medium distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak coarse subangular blocky structure; firm; common dark accumulations (Fe and Mn oxides); neutral; gradual smooth boundary.

Cg—53 to 60 inches; olive gray (5Y 5/2) and gray (5Y 5/1) silty clay loam; many medium distinct light olive brown (2.5Y 5/4 and 5/6) mottles; massive; firm; mildly alkaline.

The thickness of the solum ranges from 40 to 60 inches. The thickness of the mollic epipedon ranges from 24 to 36 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The upper part of the B2 horizon has value of 2 or 3 and chroma of 1 or 2. The control section is 35 and 42 percent clay. It is slightly acid to moderately alkaline. The Cg horizon has value of 4 to 6 and chroma of 1 or 2. Reaction is neutral to moderately alkaline.

Plano series

The Plano series consists of deep, well drained and moderately well drained, moderately permeable soils on outwash plains. These soils formed in calcareous silts and the underlying stratified loamy outwash. Slopes range from 0 to 5 percent.

Plano soils are similar to Batavia, Proctor and Waupecan soils. Batavia soils lack a mollic epipedon. Proctor soils contain more sand in the B horizon than Plano soils. Waupecan soils contain more coarse sand and gravel in the lower part of the solum and the underlying material. Plano soils commonly adjoin Drummer and Elburn soils on the landscape. Drummer soils are poorly drained, have a thicker mollic epipedon, and are in drainageways and on flats at lower elevations than Plano soils. Elburn soils are somewhat poorly drained, are less sloping, and are at lower elevations than Plano soils.

Typical pedon of Plano silt loam, 2 to 5 percent slopes, 60 feet south and 1,370 feet west of the center of sec. 23, T. 39 N., R. 7 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A12—9 to 15 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; slightly acid; abrupt smooth boundary.

B1—15 to 20 inches; brown to dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; common thin very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

B21t—20 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; continuous thin very dark grayish brown (10YR 3/2) organic coatings and clay films on faces of peds; few dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B22t—26 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; continuous moderately thick brown to dark brown (10YR 4/3) organic coatings and clay films on faces of peds; few dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

B23t—33 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; firm; continuous moderately thick brown to dark brown (10YR 4/3) organic coatings and clay films on faces of peds; few dark accumulations (Fe and Mn oxides); medium acid; abrupt smooth boundary.

IIB31—43 to 51 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) organic coatings on faces of peds; few dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

IIB32—51 to 58 inches; dark yellowish brown (10YR 4/4) sandy loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; common thin brown to dark brown (10YR 4/3) organic coatings as stains on grains; few accumulations of (Fe and Mn oxides); neutral; gradual smooth boundary.

IIC—58 to 70 inches; brown (10YR 5/3) loamy sand; massive; friable; neutral.

Thickness of the silty material ranges from 40 to 60 inches, and thickness of the solum and the depth to free carbonates range from 45 to 65 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 3 to 5 and chroma of 3 or 4. Reaction is medium acid or slightly acid. The IIB3 horizon is sandy clay loam, sandy loam, loam, or silt loam. The IIC horizon has value of 5 or 6 and chroma of 2 to 4. It is neutral to moderately alkaline sandy loam, silt loam, or loamy sand.

Proctor series

The Proctor series consists of deep, well drained and moderately well drained, moderately permeable soils on loess covered outwash plains. These soils formed in calcareous, silty loess and underlying stratified loamy outwash. Slopes range from 0 to 5 percent.

Proctor soils are similar to Harvard and Plano soils. Harvard soils lack a mollic epipedon. Plano soils have a thicker loess cover than Proctor soils. Proctor soils commonly adjoin Brenton soils on the landscape. Brenton soils are somewhat poorly drained and are in shallow depressions adjacent to drainageways.

Typical pedon of Proctor silt loam, 0 to 2 percent slopes, 750 feet west and 330 feet north of the southeast corner of sec. 11, T. 38 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate medium granular structure; slightly acid; abrupt smooth boundary.

A12—8 to 13 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; slightly acid; clear smooth boundary.

B1t—13 to 18 inches; brown to dark brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; common thin dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B215—18 to 24 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; continuous thin dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—24 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; continuous brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B23t—31 to 37 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

IIB3—37 to 48 inches; dark yellowish brown (10YR 4/4) loam; common fine distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; neutral; gradual smooth boundary.

IIC—48 to 60 inches; yellowish brown (10YR 5/4) stratified loam and silt loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; massive; mildly alkaline.

The thickness of the solum and depth to free carbonates range from 40 to 60 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. The B2t horizon has value of 3 to 6 and chroma of 3 or 4. The darker colors are in the upper part. Reaction is medium acid to neutral. The B2t horizon is 27 to 35 percent clay. The IIB3 horizon is sandy loam, loam, clay loam, or silt loam. The IIC horizon has value of 5 or 6 and chroma of 3 or 4. It is neutral to moderately alkaline stratified sandy loam, loamy sand, and silt loam.

Ripon series

The Ripon series consists of moderately deep, well drained, moderately permeable soils on ground moraines that were topographically shaped by the underlying bedrock. These soils are along the Fox River. They formed in silty material and the underlying glacial drift. Slopes range from 2 to 5 percent.

Ripon soils commonly adjoin Casco, Morley, and Rodman soils and are closely associated with Faxon soils. Casco and Rodman soils have a thinner solum, contain more sand and gravel in the lower part of the solum and underlying material, are more sloping, and are at higher elevations than Ripon soils. Morley soils are finer textured, lack a mollic epipedon, and are on morainic ridges and side slopes at higher elevations than Ripon soils. Faxon soils are poorly drained, contain more sand in the solum, and are at lower elevations than Ripon soils.

Typical pedon of Ripon silt loam from an area of Faxon-Ripon complex, 0 to 5 percent slopes, 465 feet north and 270 feet west of the center of sec. 15, T. 39 N., R. 8 E.

A1—0 to 9 inches; black (10YR 2/1) silt loam; weak very fine granular structure; friable; neutral; clear smooth boundary.

A3—9 to 13 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable; neutral; clear smooth boundary.

B21t—13 to 17 inches; dark brown to brown (10YR 4/3) silty clay loam; weak very fine subangular blocky structure; friable; discontinuous thin dark brown (10YR 3/3) organic coatings and clay films on faces of peds; slightly acid; gradual smooth boundary.

B22t—17 to 23 inches; dark brown to brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; discontinuous dark grayish brown (10YR 4/2) organic coatings and clay films on faces of peds; slightly acid; clear smooth boundary.

B23t—23 to 29 inches; dark brown to brown (10YR 4/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

IIB24t—29 to 32 inches; yellowish brown (10YR 5/4) clay loam; many medium faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few thin very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; abrupt smooth boundary.

R—32 inches; pale yellow (2.5Y 7/4) dolomitic limestone bedrock.

The thickness of the solum and depth to dolomitic limestone bedrock range from 24 to 36 inches. The thickness of the mollic epipedon ranges from 10 to 15 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or heavy silt loam. The IIB2t horizon is clay loam or loam. The B2t and IIB2t horizons are 27 to 35 percent clay. They are slightly acid to mildly alkaline and have value of 3 to 5 and chroma of 3 or 4.

Rodman series

The Rodman series consists of excessively drained soils that are moderately rapidly permeable in the solum and rapidly permeable in the underlying material. These soils are on kamic moraines and eskers and are shallow to sand and gravel. They formed in gravelly sand. Slopes range from 15 to 30 percent.

Rodman soils are similar to Casco and Lorenzo soils and commonly adjoin Casco soils on the landscape. Casco and Lorenzo soils have a thicker solum, are less sloping, and are at lower elevations than Rodman soils.

Typical pedon of Rodman sandy loam from an area of Rodman soils, 15 to 30 percent slopes, 400 feet north and 1,370 feet west of the southeast corner of sec. 10, T. 39 N., R. 8 E.

A1—0 to 7 inches; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; friable; few dolomitic pebbles; neutral; abrupt smooth boundary.

B2—7 to 11 inches; brown to dark brown (10YR 4/3) and dark brown (10YR 3/3) gravelly loam; very weak fine granular structure; friable; few limestone cobbles and common dolomitic pebbles; neutral; abrupt smooth boundary.

C—11 to 60 inches; brown to dark brown (10YR 4/3) and brown (10YR 5/3) gravelly sand; single grained; loose; many dolomitic pebbles and common limestone cobbles; mildly alkaline.

The thickness of the solum and the depth to sand and gravel range from 8 to 15 inches. The A horizon ranges from 4 to 8 inches in thickness. The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly sandy loam, but range includes gravelly loam and loam. The B horizon is gravelly loam, loam, or sandy loam. It has value of 3 to 5 and chroma of 3 or 4. Reaction is neutral or mildly alkaline. It is less than 18 percent clay. The C horizon is gravelly sand or gravel. Reaction is moderately or mildly alkaline. It has value of 4 or 5 and chroma of 3 or 4.

Rush series

The Rush series consists of deep, well drained soils on outwash plains. These soils are moderately permeable in the solum and very rapidly permeable in the underlying material. They formed in calcareous, silty and loamy material and are underlain by sand and gravel. Slopes range from 0 to 10 percent.

Rush soils are similar to Bowes and St. Charles soils. St. Charles soils contain less sand and gravel in the underlying material than Rush soils. Rush soils commonly adjoin Bowes and Drummer soils. Bowes soils have a darker colored surface horizon. Drummer soils are poorly drained and contain less sand and gravel in the underlying material.

Typical pedon from an area of Rush silt loam, 0 to 2 percent slopes, 175 feet south and 470 feet west of the northeast corner of sec. 15, T. 39 N., R. 8 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) silt loam; weak very fine granular structure; very friable; slightly acid; abrupt smooth boundary.

A2—4 to 11 inches; dark grayish brown (10YR 4/2) and brown to dark brown (10YR 4/3) silt loam; weak thick platy structure; friable; strongly acid; abrupt smooth boundary.

B1—11 to 18 inches; brown to dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silty clay loam; weak very fine subangular blocky structure; friable; strongly acid; clear smooth boundary.

B21t—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—24 to 32 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B23t—32 to 41 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse subangular blocky structure; firm; patchy thin dark brown (10YR 3/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

IIB24t—41 to 45 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse subangular blocky structure; firm; common dolomitic pebbles; slightly acid; abrupt smooth boundary.

IIC—45 to 60 inches; brown (10YR 5/4) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum and depth to gravel range from 45 to 70 inches. The A horizon ranges from 7 to 13 inches in thickness. The A1 or Ap horizon has value of 2 to 4 and chroma of 1 to 3. The A2 horizon, where present, has value of 4 or 5 and chroma of 2 or 3. The IIB2t horizon is clay loam or sandy clay loam. The B2t and IIB2t horizons have value of 4 or 5 and chroma of 3 to 6. They are 27 to 35 percent clay. Reaction is strongly acid to slightly acid. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. It is gravelly sand or gravelly loam. Reaction is moderately alkaline or mildly alkaline.

Sabina series

The Sabina series consists of deep, somewhat poorly drained, moderately slowly permeable soils on upland flats. They formed in calcareous loess and the underlying calcareous, loam till. Slopes range from 0 to 3 percent.

Sabina soils are similar to Beecher and Herbert soils. Beecher soils have more clay in the underlying material than Sabina soils. Herbert soils have a thinner loess cover and contain less clay in the B2t horizon. Sabina soils commonly adjoin Birkbeck and Drummer soils on the landscape. Birkbeck soils are moderately well drained, have less clay in the B2t horizon, and are at higher elevations than Sabina soils. Drummer soils have a mollic epipedon, are poorly drained, and are at lower elevations than Sabina soils.

Typical pedon of Sabina silt loam, 500 feet south and 975 feet east of the northwest corner of sec. 8, T. 38 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

A2—7 to 11 inches; grayish brown (10YR 5/2) silt loam; weak thin platy structure parting to moderate fine granular; friable; slightly acid; clear smooth boundary.

B21t—11 to 16 inches; olive brown (2.5Y 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common thin dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—16 to 23 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; common thin dark grayish brown (10YR 4/2) clay films on faces of peds; few medium irregular dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B23t—23 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; firm; common thin dark grayish brown (10YR 4/2) clay films on faces of peds; common medium irregular dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B24t—32 to 45 inches; light olive brown (2.5Y 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; firm; very fine thin dark grayish brown (10YR 4/2) clay films on faces of peds; common medium irregular dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

IIB3—45 to 55 inches; light olive brown (2.5Y 5/4) clay loam; many medium distinct light olive brown (2.5Y 5/6) and olive brown (2.5Y 6/8) mottles; weak coarse subangular blocky structure; firm; few medium irregular dark accumulations (Fe and Mn oxides); few dolomitic pebbles; neutral; gradual smooth boundary.

IIC—55 to 60 inches; yellowish brown (10YR 5/4) loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; few medium irregular dark accumulations (Fe and Mn oxides); common dolomitic pebbles; moderately alkaline.

Thickness of the loess ranges from 40 to 55 inches, and thickness of the solum and the depth to free carbonates range from 44 to 65 inches.

The A horizon ranges from 10 to 14 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The A2 horizon has value of 4 or 5 and chroma of 2. The B2t horizon has value of 4 or 5 and chroma of 2 to 4, and is distinctly mottled. It is silty clay loam that is 35 to 42 percent clay. Reaction is neutral to medium acid. The IIB3 horizon is heavy loam or clay loam. The IIC horizon has value of 4 to 6 and chroma of 2 to 4.

St. Charles series

The St. Charles series consists of deep, well drained and moderately well drained, moderately permeable soils on uplands. These soils formed in calcareous, silty loess and the underlying, stratified loamy outwash. Slopes range from 0 to 5 percent.

St. Charles soils are similar to Batavia and Camden. Batavia soils have a darker colored surface horizon. Camden soils have shorter slopes and have a thinner loess cover than St. Charles soils and contain more sand within a depth of 40 inches. St. Charles soils commonly adjoin Virgil soils on the landscape. Virgil soils have a darker colored surface horizon, are somewhat poorly drained, and are at lower elevations than St. Charles soils.

Typical pedon of St. Charles silt loam, 2 to 5 percent slopes, 325 feet south and 1,330 feet west of the northeast corner of sec. 27, T. 40 N., R. 6 E.

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

B1—8 to 15 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine angular blocky structure; friable; few thin dark grayish brown (10YR 4/2) coatings lining pores; slightly acid; clear smooth boundary.

B21t—15 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate fine angular blocky; friable; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); strongly acid; clear smooth boundary.

B22t—24 to 32 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); strongly acid; clear smooth boundary.

B23t—32 to 41 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); strongly acid; abrupt smooth boundary.

IIB24t—41 to 48 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate coarse subangular blocky structure; friable; few thin brown to dark brown (10YR 4/3) clay films on faces of peds; few fine rounded dark accumulations (Fe and Mn oxides); medium acid; clear smooth boundary.

IIB31—48 to 58 inches; mixed brown to dark brown (7.5YR 4/4) and yellowish brown (10YR 5/4) sandy clay loam; weak coarse subangular blocky structure; friable; very few fine rounded dark accumulations (Fe and Mn oxides); strongly acid; clear smooth boundary.

IIB32—58 to 65 inches; mixed brown to dark brown (7.5YR 4/4) and yellowish brown (10YR 5/4) sandy loam; very weak coarse subangular blocky structure; friable; strongly acid; clear smooth boundary.

IIC—65 to 70 inches; stratified yellowish brown (10YR 5/4) sand and dark yellowish brown (10YR 4/4) loamy sand; single grained; loose; neutral.

The thickness of loess ranges from 40 to 55 inches, and thickness of the solum ranges from 50 to 70 inches.

The A horizon ranges from 7 to 12 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. The IIB3 horizon is sandy clay loam, loam, silt loam, or sandy loam. The IIC horizon is stratified loamy sand, sandy loam, loam, or sand. It has value of 4 or 5 and chroma of 3 or 4. Reaction is neutral or mildly alkaline.

Saybrook series

The Saybrook series consists of deep, well drained and moderately well drained, moderately permeable soils on loess covered till plains. These soils formed in calcareous, silty loess and the calcareous, underlying loam till. Slopes range from 0 to 10 percent.

Saybrook soils are similar to Catlin soils. Catlin soils have a thicker loess cover than Saybrook soils. Saybrook soils commonly adjoin Drummer and Flanagan soils on the landscape. The poorly drained Drummer soils have a thicker mollic epipedon and are on flats and in drainageways. Flanagan soils are somewhat poorly drained, have a fine-textured B2 horizon, and are on upland flats and in shallow depressions at lower elevations than Saybrook soils.

Typical pedon of Saybrook silt loam, 2 to 5 percent slopes, 160 feet south and 1,825 feet east of the center of sec. 23, T. 38 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate fine granular structure; friable; neutral; clear smooth boundary.

A12—8 to 13 inches; black (10YR 2/1) silt loam; moderate fine granular structure; friable; neutral; clear smooth boundary.

B1t—13 to 18 inches; dark brown (10YR 3/3) silt loam; weak fine subangular blocky structure; friable; slightly acid; clear smooth boundary.

B21t—18 to 26 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; common thin very dark grayish brown (10YR 3/2) coatings on faces of peds; friable; medium acid; clear smooth boundary.

IIB22t—26 to 32 inches; brown to dark brown (10YR 4/3) clay loam; moderate medium subangular blocky structure; friable; discontinuous thin very dark grayish brown (10YR 3/2) coatings on faces of peds; medium acid; clear smooth boundary.

IIB23t—32 to 37 inches; brown to dark brown (10YR 4/3) clay loam; weak medium subangular blocky structure; discontinuous thin very dark grayish brown (10YR 3/2) coatings on faces of peds; firm; slightly acid; clear smooth boundary.

IIB3—37 to 40 inches; yellowish brown (10YR 5/4) loam; few medium distinct yellowish red (5YR 5/8) mottles; weak coarse subangular blocky structure; friable; slight effervescence; mildly alkaline; gradual smooth boundary.
IIC—40 to 60 inches; yellowish brown (10YR 5/4) loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 24 to 40 inches. Thickness of the mollic epipedon ranges from 10 to 18 inches.

The A horizon has a value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and a chroma of 3 to 6. The part of the B horizon that formed in loess is silty clay loam, and the part that formed in till is clay loam, loam, or silt loam. The B2 horizon is 27 to 35 percent clay. Reaction is medium acid or slightly acid. The C horizon has value of 5 or 6 and chroma of 4 through 8. It is mildly alkaline or moderately alkaline.

Selma series

The Selma series consists of deep, poorly drained, moderately permeable soils on flats and in drainageways on outwash plains. These soils formed in stratified, loamy outwash. Slopes range from 0 to 2 percent.

Selma soils are similar to Canisteo and Drummer soils. Canisteo soils have a higher calcium carbonate equivalent in the solum than Selma soils. Drummer soils contain less sand in the solum.

Selma soils commonly adjoin Fox and Martinsville soils on the landscape. Fox and Martinsville soils are well drained, lack a mollic epipedon, and are on ridges at higher elevations than Selma soils.

Typical pedon of Selma loam, 570 feet east and 1,490 feet north of the southwest corner of sec. 15, T. 42 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) loam; moderate fine granular structure; very friable; mildly alkaline; abrupt smooth boundary.
A12—8 to 13 inches; black (10YR 2/1) loam; weak fine subangular blocky structure and moderate fine granular structure; friable; mildly alkaline; clear smooth boundary.
B1g—13 to 19 inches; olive gray (5Y 4/2) loam; weak medium subangular blocky structure; firm; common thin very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.
B21g—19 to 27 inches; olive gray (5Y 4/2) clay loam; few fine distinct light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; patchy thin dark gray (10YR 4/1) organic coatings on faces of peds; few fine dark accumulations (Fe and Mn oxides); few dolomitic pebbles; neutral; clear smooth boundary.
B22g—27 to 34 inches; olive gray (5Y 5/2) clay loam; many coarse distinct olive yellow (2.5Y 6/6) mottles; moderate medium subangular blocky structure; firm; patchy thin olive brown (2.5Y 4/4) coatings on faces of peds; few fine dark accumulations (Fe and Mn oxides); few dolomitic pebbles; neutral; clear smooth boundary.
B23g—34 to 40 inches; olive gray (5Y 5/2) clay loam; many coarse distinct olive yellow (2.5Y 6/6 and 6/8) mottles; moderate coarse subangular blocky structure; firm; patchy thin dark grayish brown (2.5Y 4/2) organic coatings on faces of peds; few medium dark accumulations (Fe and Mn oxides); few dolomitic pebbles; mildly alkaline; clear smooth boundary.
B3g—40 to 45 inches; olive gray (5Y 5/2) sandy loam; common medium distinct olive yellow (2.5Y 6/6) mottles; weak coarse subangular blocky structure; friable; very few very dark gray (10YR 3/1) coatings; common medium dark accumulations (Fe and Mn oxides); mildly alkaline; clear smooth boundary.
Cg—45 to 60 inches; olive gray (5Y 5/2) stratified silt loam and sandy loam; common medium distinct olive yellow (2.5Y 6/6) mottles; massive; friable; common medium dark accumulations (Fe and Mn oxides); strong effervescence; moderately alkaline.

The solum ranges from 35 to 55 inches in thickness. Thickness of the mollic epipedon ranges from 12 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly loam, but includes clay loam. The B1g horizon is loam or clay loam. The B2g horizon has value of 4 to 6 and chroma of 1 or 2. It is clay loam that is 27 and 35 percent clay. Reaction is medium acid to mildly alkaline. The B3g horizon is loam, sandy loam, or sandy clay loam. The Cg horizon has value of 4 to 6 and chroma of 1 or 2. It is stratified silt loam, sand, loamy sand, or sandy loam. Reaction is moderately alkaline or mildly alkaline.

Thorp series

The Thorp series consists of deep, poorly drained, slowly permeable soils in depressions on outwash plains. These soils formed in calcareous, silty loess and the stratified, underlying loamy outwash. Slopes range from 0 to 2 percent.

Thorp soils are similar to Virgil soils and commonly adjoin Drummer and Elburn soils on the landscape. Drummer soils lack an A2 horizon. Elburn and Virgil soils are somewhat poorly drained and are at higher elevations than Thorp soils.

Typical pedon of Thorp silt loam, 1,610 feet south and 84 feet west of the northeast corner of sec. 13, T. 38 N., R. 7 E.

Ap—0 to 12 inches; very dark gray (10YR 3/1) silt loam; weak very fine and fine granular structure; friable; neutral; abrupt smooth boundary.
A21—12 to 16 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium platy structure; friable; slightly acid; clear smooth boundary.
A22—16 to 20 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate thick platy structure; friable; medium acid; clear smooth boundary.
B21tg—20 to 24 inches; gray (5Y 5/1) silty clay loam; many fine distinct strong brown (7.5YR 5/6) and light olive brown (2.5Y 5/6) mottles; moderate fine and medium subangular blocky structure; firm; patchy thin dark grayish brown (2.5Y 4/2) clay films on faces of peds; medium acid; clear smooth boundary.
B22tg—24 to 29 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; continuous thin very dark grayish brown (2.5Y 3/2) clay films on faces of peds; firm; medium acid; clear smooth boundary.
B23tg—29 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; firm; continuous dark gray (10YR 4/1) clay films on faces of peds; slightly acid; clear smooth boundary.
B31tg—39 to 54 inches; gray (5Y 5/1) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; dark gray (10YR 4/1) clay films lining pores; neutral; clear smooth boundary.
IIB32tg—54 to 63 inches; gray (5Y 5/1) clay loam; many medium distinct strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2) mottles; very weak coarse subangular blocky structure; friable; neutral; abrupt smooth boundary.
IIC—63 to 70 inches; dark grayish brown (10YR 4/2) sandy loam; common fine distinct light olive brown (2.5Y 5/6) and grayish brown (10YR 5/2) mottles; massive; friable; strong effervescence; mildly alkaline.

The thickness of the loess ranges from 40 to 55 inches, and thickness of the solum and depth to free carbonates range from 45 to 70 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 4 to 6 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 1 or 2, and is distinctly mottled. Reaction is neutral or medium acid. The IIC horizon is stratified clay loam, silt loam, or sandy loam. It has value of 4 or 5 and chroma of 1 or 2, and is mottled. Reaction is moderately alkaline or mildly alkaline.

Varna series

The Varna series consists of deep, well drained and moderately well drained, moderately slowly permeable soils on uplands. These soils formed in a thin layer of calcareous, silty material and the calcareous, underlying silty clay loam till. Slopes range from 2 to 10 percent.

Varna soils are similar to Markham and Morley soils. Markham and Morley soils lack a mollic epipedon and are at higher elevations than Varna soils. Varna soils commonly adjoin Elliott and Milford soils on the landscape. Elliott soils are somewhat poorly drained and are at lower elevations. Milford soils are poorly drained and are in drainageways at lower elevations than Varna soils.

Typical pedon of Varna silt loam, 2 to 5 percent slopes, 1,590 feet north and 470 feet east of the southwest corner of sec. 9, T. 39 N., R. 8 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

A12—8 to 11 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

IIB1t—11 to 15 inches; dark brown (10YR 3/3) silty clay loam; weak fine subangular blocky structure; firm; few thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; very few dolomitic pebbles; neutral; abrupt smooth boundary.

IIB22t—15 to 22 inches; brown to dark brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; firm; common thin dark brown (10YR 3/3) clay films on faces of peds; few dolomitic pebbles; slightly acid; clear smooth boundary.

IIB23t—22 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate coarse and medium subangular blocky structure; firm; common thin brown to dark brown (10YR 4/3) clay films on faces of peds; common dolomitic pebbles; neutral; clear smooth boundary.

IIB3—30 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; common dolomitic pebbles; slight effervescence; mildly alkaline; gradual smooth boundary.

IIC—37 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; friable; common dolomitic pebbles; strong effervescence; moderately alkaline.

Thickness of the silty mantle is less than 18 inches, and thickness of the solum and the depth to free carbonates range from 24 to 48 inches. Thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The IIB2t horizon has value of 4 to 6 and chroma of 3 or 4. It is silty clay loam and silty clay in the upper part and silty clay loam in the lower part. It is 35 and 42 percent clay. Reaction is neutral to medium acid. The IIC horizon has value of 5 or 6 and chroma of 2 to 4. Reaction is moderately alkaline or mildly alkaline.

Virgil series

The Virgil series consists of deep, somewhat poorly drained, moderately permeable to moderately slowly permeable soils on loess covered glacial outwash plains. These soils formed in calcareous, silty loess and the calcareous, underlying glacial outwash. Slopes range from 0 to 3 percent.

Virgil soils are similar to Elburn and Millbrook soils. Elburn soils have a mollic epipedon. Millbrook soils have a thinner loess cover than Virgil soils. Virgil soils commonly adjoin Batavia, Drummer, and St. Charles soils on the landscape. Batavia and St. Charles soils are well drained and moderately well drained and generally are more sloping. Drummer soils are poorly drained, have a mollic epipedon, and are on flat areas and in drainageways.

Typical pedon of Virgil silt loam, 2,310 feet south and 1,520 feet west of the northeast corner of sec. 10, T. 40 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; neutral; abrupt smooth boundary.

A2—9 to 14 inches; grayish brown (10YR 5/2) silt loam; moderate thin platy structure; very friable; slightly acid; clear smooth boundary.

B1—14 to 18 inches; brown (10YR 5/3) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; friable; continuous thin grayish brown (10YR 5/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B21t—18 to 26 inches; brown to dark brown (10YR 4/3) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; strong fine subangular blocky structure; firm; continuous moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds; few fine irregular dark accumulations (Fe and Mn oxides); slightly acid; clear smooth boundary.

B22t—26 to 35 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium prismatic structure; firm; continuous moderately thick dark grayish brown (10YR 4/2) clay films on faces of peds and very dark grayish brown (10YR 3/2) organic coatings lining pores; few fine dark accumulations (Fe and Mn oxides); neutral; clear smooth boundary.

B23t—35 to 42 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; few moderately thick very dark grayish brown (10YR 3/2) organic coatings lining pores; few fine dark accumulations (Fe and Mn oxides); few fine dolomitic pebbles; neutral; clear smooth boundary.

B31—42 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; many coarse distinct yellowish brown (10YR 5/8) and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few moderately thick very dark grayish brown (10YR 3/2) organic coatings lining pores; few fine dark accumulations (Fe and Mn oxides); few fine dolomitic pebbles; mildly alkaline; clear smooth boundary.

IIB32—48 to 55 inches; grayish brown (2.5Y 5/2) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm; few moderately thick very dark grayish brown (10YR 3/2) organic coatings lining pores; few fine dark accumulations (Fe and Mn oxides); common fine dolomitic pebbles; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—55 to 60 inches; stratified light gray (10YR 6/1) and light brownish gray (2.5Y 6/2) silt loam and fine sandy loam; many coarse distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) mottles; massive; friable; few fine dark accumulations (Fe and Mn oxides); strong effervescence; mildly alkaline.

The thickness of the solum and the depth to free carbonates range from 45 to 70 inches. The A horizon ranges from 7 to 14 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 4 or 5 and chroma of 1 or 2. The B2t horizon has value of 4 to 6 and chroma of 2 to 4. Darker colors are in the upper part of the horizon. Reaction is medium acid to neutral. The IIB3 horizon is sandy loam, sandy clay loam, silt loam, or clay loam. The IIC horizon has value of 4 to 6 and chroma of 1 to 4. It is mildly alkaline or moderately alkaline.

Warsaw series

The Warsaw series consists of well drained soils on outwash plains and stream terraces. These soils are moderately permeable in the solum and rapidly permeable in the underlying material. They are moderately deep to sand and gravel and formed in loamy outwash and the underlying sand and gravel. Slopes range from 0 to 5 percent.

Warsaw soils are similar to Fox and Lorenzo soils. Fox soils lack a mollic epipedon. Warsaw soils commonly adjoin Kane, Lorenzo, and Will soils on the landscape. Kane soils are somewhat poorly drained and are at lower elevations than Warsaw soils. Lorenzo soils have a thinner solum and have shorter slopes than Warsaw soils. Will soils are poorly drained and are in drainageways.

Typical pedon of Warsaw loam, 2 to 5 percent slopes, 325 feet south and 1,290 feet west of the center of sec. 1, T. 42 N., R. 7 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 11 inches; very dark grayish brown (10YR 3/2) loam; moderate fine and medium granular structure; friable; neutral; clear smooth boundary.

B21t—11 to 16 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; common thin dark brown (7.5YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—16 to 24 inches; brown to dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; many thin brown to dark brown (7.5YR 4/2) clay films on faces of peds; few dolomitic pebbles; slightly acid; clear smooth boundary.

B23t—24 to 32 inches; brown to dark brown (7.5YR 4/4) sandy clay loam; moderate medium and coarse subangular blocky structure; friable; many thin brown to dark brown (7.5YR 4/2) clay films on faces of peds and as stains on grains; common dolomitic pebbles; neutral; abrupt smooth boundary.

IIC—32 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; many dolomitic pebbles; mildly alkaline.

The thickness of the solum and depth to sand and gravel range from 24 to 40 inches. Thickness of the mollic epipedon ranges from 10 to 14 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly loam, but range includes silt loam and sandy loam. The B2t horizon has value of 3 to 5 and chroma of 3 or 4. It is clay loam or sandy clay loam that is 27 to 35 percent clay. Reaction is medium acid to neutral. The IIC horizon has value of 4 or 5 and chroma of 3 or 4. Reaction is mildly alkaline or moderately alkaline.

Wauconda series

The Wauconda series consists of deep, somewhat poorly drained, moderately permeable soils on upland flats near drainageways. These soils formed in calcareous, silty material and the underlying, stratified loamy outwash. Slopes range from 0 to 3 percent.

Wauconda soils are similar to Millbrook soils. Millbrook soils have a thicker solum. Wauconda soils commonly adjoin Drummer and Zurich soils on the landscape. Drummer soils are poorly drained, have a mollic epipedon, and are in drainageways at lower elevations than Wauconda soils. Zurich soils are well drained and moderately well drained, have a lighter colored horizon, and are at higher elevations than Wauconda soils.

Typical pedon of Wauconda silt loam, 580 feet south and 340 feet west of the northeast corner of sec. 12, T. 38 N., R. 8 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A2—8 to 11 inches; dark grayish brown (10YR 4/2) silt loam; very weak thin platy structure; friable; slightly acid; clear smooth boundary.

B1—11 to 16 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B21t—16 to 23 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; continuous thin very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B22t—23 to 31 inches; brown (10YR 5/3) silty clay loam; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; discontinuous thin dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.

IIB3—31 to 36 inches; grayish brown (2.5Y 5/2) silt loam and noticeable sand; common medium distinct light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; friable; few light gray (10YR 7/1) lime accumulations; mildly alkaline; clear smooth boundary.

IIC—36 to 60 inches; grayish brown (2.5Y 5/2) stratified silt loam and sandy loam; many medium distinct light olive brown (2.5Y 5/6) mottles; massive; friable; few light gray (10YR 7/1) lime accumulations; moderately alkaline.

The thickness of the silty mantle ranges from 20 to 40 inches, and thickness of the solum and depth to free carbonates range from 20 to 40 inches.

The A horizon ranges from 7 to 12 inches in thickness. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 4 to 6 and chroma of 2. The B2t horizon has value of 4 or 5 and chroma of 2 to 4, and is distinctly mottled. Reaction is medium acid to neutral. The IIB3 horizon is silt loam, clay loam, or loam. The IIC horizon has value of 5 to 6 and chroma of 2 to 4. It is stratified silt loam, loamy sand, or sandy loam.

Waupecan series

The Waupecan series consists of deep, well drained soils on outwash plains and terraces. These soils are moderately permeable in the solum and very rapidly permeable in the underlying material. They formed in calcareous, silty and loamy material and are underlain by sand and gravel. Slopes range from 0 to 5 percent.

Waupecan soils are similar to Bowes and Plano soils. Bowes soils lack a mollic epipedon. Plano soils contain less coarse sand and gravel in the lower part of the solum and the underlying material. Waupecan soils commonly adjoin Drummer and Elburn soils on the landscape. Drummer soils are poorly drained, have a thicker mollic epipedon, and are located in drainageways and on flats at lower elevations than Waupecan soils. Elburn soils are somewhat poorly drained, are less sloping, and are at lower elevations than Waupecan soils.

Typical pedon of Waupecan silt loam, 0 to 2 percent slopes, 125 feet south and 1,390 feet west of the northeast corner of sec. 21, T. 42 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 13 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; slightly acid; clear smooth boundary.

B1—13 to 19 inches; brown to dark brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; firm; common thin very dark grayish brown (10YR 3/2) organic coatings lining pores; slightly acid; clear smooth boundary.

B21t—19 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—28 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse subangular blocky structure; firm; continuous thin brown to dark brown (10YR 4/3) clay films on faces of peds; medium acid; abrupt smooth boundary.

IIB23t—38 to 44 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and coarse subangular blocky structure; firm; discontinuous thin brown to dark brown (7.5YR 4/2) clay films on faces of peds; few dolomitic pebbles; medium acid; clear smooth boundary.

IIB31t—44 to 49 inches; brown to dark brown (7.5YR 4/4) sandy clay loam; weak coarse subangular blocky structure; friable; many moderately thick dark reddish brown (5YR 3/4) organic coatings as stains on grains; common dolomitic pebbles; slightly acid; clear smooth boundary.

IIB32—49 to 55 inches; brown to dark brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; many moderately thick dark reddish brown (5YR 3/3) organic coatings as stains on grains; common dolomitic pebbles; neutral; abrupt smooth boundary.

IIC—55 to 70 inches; brown (10YR 5/3) gravelly sand; single grained; loose; many dolomitic pebbles and cobblestones; moderately alkaline.

The thickness of the solum and depth to free carbonates range from 45 to 65 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. It is silty clay loam that is 27 to 35 percent clay. Reaction is medium acid or slightly acid. The IIB3 horizon is loam, sandy loam, sandy clay loam, or clay loam. The IIC horizon is gravelly sand or gravelly loam. Reaction is mildly alkaline or moderately alkaline. It has value of 5 or 6 and chroma of 3 or 4.

Will series

The Will series consists of poorly drained soils along drainageways. These soils are moderately deep to sand and gravel. They formed in loamy outwash and the underlying sand and gravel. They are moderately permeable in the subsoil and rapidly permeable in the underlying material. Slopes range from 0 to 2 percent.

The B3g horizon is thicker than the allowable range for the series, but this difference does not alter the usefulness or behavior of the soils.

Will soils are similar to Canisteo and Selma soils. Canisteo soils have more calcium carbonate in the solum than Will soils and contain less sand and gravel to a depth of 40 inches. Selma soils contain less sand and gravel in the solum and underlying material. Will soils commonly adjoin Kane soils on the landscape. Kane soils are somewhat poorly drained and are at higher elevations than Will soils.

Typical pedon of Will silty clay loam, 660 feet south and 1,400 feet east of the center of sec. 4, T. 42 N., R. 6 E.

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam; weak very fine granular structure; very friable; neutral; abrupt smooth boundary.

A12—6 to 11 inches; black (10YR 2/1) silty clay loam; weak very fine granular structure; friable; neutral; clear smooth boundary.

B1—11 to 15 inches; very dark gray (10YR 3/1) clay loam; weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

B2g—15 to 22 inches; olive gray (5Y 5/2) clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; neutral; gradual smooth boundary.

B3g—22 to 31 inches; dark gray (5Y 4/1) and grayish brown (2.5Y 5/2) sandy loam; weak fine subangular blocky structure; friable; slight effervescence; mildly alkaline; many cobbles 1 to 2 inches in diameter; abrupt smooth boundary.

IICg—31 to 60 inches; grayish brown (2.5Y 5/2) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum and depth to free carbonates and sand and gravel range from 24 to 40 inches. Thickness of the mollic epipedon ranges from 12 to 16 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly silty clay loam, but range includes clay loam and loam. The B2g horizon has value of 4 to 6 and chroma of 1 or 2. It is clay loam or heavy loam that is 27 and 35 percent clay. The IIC horizon has value of 5 or 6 and chroma of 2 to 4. It is gravelly sand or gravelly loam. Reaction is moderately alkaline.

Zurich series

The Zurich series consists of deep, well drained and moderately well drained, moderately permeable soils on uplands. These soils formed in calcareous, silty material and the underlying, stratified loamy outwash. Slopes range from 2 to 5 percent.

Zurich soils are similar to Camden soils. Camden soils have a thicker solum and are more deeply leached than Zurich soils. Zurich soils commonly adjoin Drummer and Wauconda soils on the landscape. Drummer soils are poorly drained, have a mollic epipedon, and are in drainageways. Wauconda soils are somewhat poorly drained, have a darker colored surface horizon, and are in shallow depressions at lower elevations than Zurich soils.

Typical pedon of Zurich silt loam, 2 to 5 percent slopes, 1,155 feet south and 330 feet east of the center of sec. 36, T. 39 N., R. 8 E.

Ap—0 to 7 inches; brown to dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

B1—7 to 12 inches; brown to dark brown (10YR 4/3) silt loam; weak very fine subangular blocky structure; slightly acid; friable; clear smooth boundary.

B21t—12 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—17 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse subangular blocky structure; firm; patchy thin brown to dark brown (10YR 4/3) clay films on faces of peds; neutral; abrupt smooth boundary.

B23t—21 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium distinct brownish yellow (10YR 6/6) mottles; moderate coarse subangular blocky structure; firm; few thin brown to dark brown (10YR 4/3) clay films on faces of peds; neutral; abrupt smooth boundary.

IIB3—28 to 31 inches; yellowish brown (10YR 5/4) silt loam and high amounts of sand; common medium distinct brownish yellow (10YR 6/6) and yellow (10YR 7/6) mottles; weak coarse subangular blocky structure; friable; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—31 to 60 inches; light yellowish brown (10YR 6/4) stratified silt loam and fine sandy loam; many medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; massive; friable; strong effervescence; moderately alkaline.

Thickness of the silty mantle ranges from 20 to 40 inches, and thickness of the solum and the depth to free carbonates range from 20 to 40 inches.

The A horizon ranges from 7 to 9 inches in thickness. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. Reaction is slightly acid in the upper part of the horizon and neutral or mildly alkaline in the lower part. The IIB3 horizon is dominantly silt loam, but range includes loam and sandy loam. The IIC horizon is stratified silt loam, loam, and fine sandy loam. It has value of 5 or 6 and chroma of 2 to 6.

Formation of the soils

The factors of soil formation are discussed in this section. These factors are then related to the formation of soils in Kane County, and the processes of soil formation are explained.

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic agencies (*5*). The characteristics of a soil at any given time are determined by the physical and mineralogical composition of the *parent material*; the *climate* under which the soil material has accumulated and existed since accumulation; the *vegetation* and *animal life* on and in the soil; the *relief*, or lay of the land; and the *time* the forces of soil formation have acted on the soil material. Climate, vegetation, and animal life are the active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of *climate*, *vegetation*, and *animal life* are conditioned by *relief*. The *parent material* also affects the kind of soil profile that is formed and, in a few cases, determines it almost entirely. Finally, *time* is needed for changing the *parent material* into a soil profile. The five factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent material

The parent materials in Kane County are loess, coarse and medium textured glacial outwash, glacial till, alluvium, and organic deposits. Some of these materials are over limestone bedrock.

About 85 percent of the soils in Kane County formed partly in windblown silt called loess. The thickness of this loess mantle varies from several inches to 4 or 5 feet in the county, depending on the location with respect to the loess sources. Loess thickness is greatest in the southwestern part of the county. The Flanagan, Batavia, and Waupecan series are examples of soils that have 3 to 5 feet of loess overlying a contrasting parent material. Casco, Morley, and Miami soils on the other hand, have little or no loess in their profile.

About 41 percent of the soils formed partly or entirely in medium textured glacial outwash. This material generally consists of stratified layers of sands and silts deposited by melt water. Sands are deposited under a more rapid flow; silts are deposited when the flow slows or ceases. The Harvard, Martinsville, and Brenton soils formed entirely or partly in loamy outwash.

Glacial till, unstratified glacial drift deposited directly by ice, underlies all of the soils in Kane County except those in a few areas along the Fox River where limestone bedrock is exposed. There are five glacial till members; each has distinct properties that separate it from the others.

From the standpoint of soil formation, three of these members have similar textural properties. These three are the Tiskilwa Till Member, the Malden Till Member, and the Gilbert Till Member (the latter an informal member). The texture of all three is loam. They are structureless (massive) and have moderate permeability. The Miami, Saybrook, and Octagon soil formed entirely or partly in these tills, and about 24 percent of the soils in Kane County formed in them.

Texture of the Yorkville Till Member is silty clay loam. It, too, is structureless (massive) but has moderately slow or slow permeability. This till contains more clay and consequently is less permeable than loam tills. The Morley, Beecher, and Milford soils formed in this till; and about 13 percent of the soils in Kane County formed in it.

The Haeger Till Member is sandy loam and is structureless (massive). It has moderately rapid permeability. This till is very thin. Gravel and sand at the surface are common. The Kidder soils formed in this till. Only about 0.5 percent of the soils in Kane County formed in it.

About 15 percent of the soils in Kane County formed partly in deposits of sand and gravel. The thickness of these deposits ranges from less than 20 feet to more than 50 feet. The Waupecan, Rodman, and Will soils formed partly in this material. Sand and gravel generally are deposited by rapidly moving melt water from glacial ice packs. The landforms created by sand and gravel deposits are kames, eskers, and broad outwash valleys.

Alluvium accounts for about 2 percent of the soils in Kane County. This material is usually the most recently deposited in the county. Present day streams and rivers deposit silts and sands on their flood plains. Otter and Millington soils formed in alluvium.

About 3 percent of the soils in Kane County formed in organic deposits. These soils formed in depressions which are wet to the extent that only such water-adapted vegetation as sages, rushes, and cattails will survive. Remains of this vegetation accumulate rapidly and range in thickness from a few feet to as much as 70 feet. The Houghton and Lena soils formed in highly decomposed plant remains. Peat deposits are rare in the county, but they are present in some areas.

Only about 0.5 percent of the soils in Kane County formed in glacial drift or alluvium that is moderately deep to limestone bedrock. Faxon and Ripon are examples of soils that are underlain by limestone bedrock.

About 1 percent of the soil in Kane County has been reworked by man. The parent material is highly variable and as such cannot be classified. These areas are generally made up of fill from other sources, concrete, asphalt, refuse, and steel structures.

Plants and animals

Plants have an important effect of the formation of the soils of the survey area, but animals and organisms that live on and in the soils are also important. The changes they cause depend mainly on the kinds of life processes peculiar to each species. The kinds of plants and animals that live on and in the soils are affected in turn by climate, parent material, relief, and the age of the soil.

About 52 percent of the soils in this county formed under such prairie grass vegetation as big bluestem and indiangrass. These soils have a dark surface layer. About 22 percent of the soils in this county formed under woodland made up of such species as bur oak, white oak, and hickory. These soils have a light colored surface layer. A mixed stand of forest and grass vegetation influenced about 23 percent of the soils in the county, causing them to have a moderately dark surface layer. About 3 percent of the soils formed entirely in organic material and are dark throughout. Soils that formed under grasses generally have a darker surface layer than those that did not. They contain more organic matter and have a higher base saturation than those that formed under trees.

Small burrowing animals, such as insects, grubs, earthworms, crawfish, fungi, microbes, and other such organisms, influence the formation of soil by mixing organic matter into it and by helping break down the remains of plants. It is generally quite evident, for example, that earthworms have mixed some of the soils to varying degrees and depths. Bacteria and fungi aid in decomposition of plant and animal remains and thus add organic matter to the soil. Snail shells influence, to a large degree, the reaction of such soils as Harpster, Canisteo, and Lena.

Climate

Climate is one of the most important factors in soil development. The most important components of climate are precipitation and temperature.

Temperature and precipitation control the rate of chemical and physical weathering of parent material. Alternate freezing and thawing break down minerals and rock fragments. Water percolating downward leaches carbonates and exchangable bases from the soil. The percolating water causes formation and movement of clay in the profile. Most of this clay accumulates in the subsoil.

Vegetation is influenced by variations in temperature and precipitation. The influence of these components is most evident when broad regions are compared. Vegetation differences in arid and frigid climates are examples.

Kane County has a humid, temperate climate which favors both weathering and redistribution of soil constituents. The climate has also been favorable for the growth of hardwood forest and prairie grasses. Hardwood forest was on the more sloping end moraines, kames, and eskers. Prairie grasses were on less sloping outwash valleys and drainageways.

Relief

Relief controls the amount of moisture in the soil through its influence on the amount of runoff, the degree of erosion, and the amount of water infiltrating the soil.

Differences in natural drainage generally are closely associated with slope or relief. Soil drainage, in turn, greatly affects the color of the soil. Soils that are formed in more sloping uplands are well drained and moderately well drained and have brown and yellowish brown subsoils. Catlin and Fox soils are examples. Soils that formed in low landscape positions such as drainageways and depressions are poorly drained and have a gray subsoil. Drummer and Harpster soils are examples. Soils that formed in some intermediate landscape positions such as knolls and low lying ridges are somewhat poorly drained and have a mixed gray and brown subsoil. Brenton and Beecher soils are examples.

Relief also influences runoff and soil erosion, which usually increase with slope. Some soils have been eroded to the extent that there is little soil horizonation. Kane County soils, however, have undergone little geologic erosion.

Time

Time is necessary for the formation of soil in parent material. Generally a long period of time is required for the formation of soils that have distinct, well expressed horizons.

Soils normally become more strongly formed with increased time of exposure to weathering processes. Most of the soils in Kane County began formation with the retreat of the last glaciation about 12,500 years ago. Bottomland soils, such as Otter and Millington, accumulate surface deposits each time they become flooded. They are much younger than other soils in the county and are only weakly formed.

The most recent soil, Urban land–Loamy Orthents, is soil material that has been altered by man. Depending on the care man takes to stabilize this material, formation of soil horizons will take several hundred to several thousand years.

Geology of the county

The surficial geology of Kane County is described briefly in this section. Knowledge of this geology provides a basis for understanding the parent material from which soils are derived.

The glaciers that covered the county influence the present day soils in Kane County. The continental glaciers that reached Kane County brought with them ground up soil and rock material from Canada, Wisconsin, and the basin of Lake Michigan. The material was then deposited, either by the ice itself, or by the melt waters as the ice retreated. This glacial drift covers all of Kane County except for a narrow corridor along the Fox River where moving water has exposed limestone bedrock. The glacial drift and other surficial material has been identified numerically in figure 13, a surficial geology map of Kane County, as follows: (1) medium textured outwash over sand and gravel; (2) deep medium textured outwash; (3) yellow sandy loam till (Haeger Till Member); (4) gray silty clay loam till (Yorkville Till Member); (5) yellow gray loam till (Malden Till Member); (6) light yellow brown loam till (Gilbert Till, an informal member); (7) pink loam till (Tiskilwa Till Member); and (8) Silurian limestone bedrock and sand and gravel.

Glacial drift is placed in several categories, depending on the mode of deposition. Ice deposited drift is called glacial till and is usually heterogeneous. Drift that has been sorted or deposited by glacial melt waters is called outwash, and it usually consists of stratified silts and sands. Sand and gravel deposits also occur in outwash basins along with the finer textured sand and silts. Another melt water deposit of sand and gravel occurs in the form of *kames* and *eskers*. These conical and elongated mounds were formed from very rapidly moving melt water on top and through the glaciers.

Glacial till covers the entire county (*3*) and five different kinds have been named (*16*). The five tills exposed in the county are part of the Wedron Formation. They include, from youngest to oldest: Haeger Till Member, Yorkville Till Member, Malden Till Member, Gilbert Till (an informal Member), and Tiskilwa Till Member. All of these tills are included in the Woodfordian Substage of the Wisconsinan Stage, and were deposited between 22,000 and 12,500 years ago. Older Wisconsinan and some Illinoian age tills also underlie the county, but these tills are deeply buried and have not had much influence on the development of soils in the county.

The till of the Haeger Member is yellowish brown sandy loam. It is highly variable in texture and has many outcrops of sand and gravel. It is less than 10 feet thick. Thick sand and gravel outwash deposits and the light yellowish brown or gray Yorkville till lie beneath the Haeger till. This till is dominant in the southwest part of Kane County.

The Yorkville Till Member is gray or light yellowish brown silty clay loam. It is uniform in texture but contains coarse silts in places. Dolomitic pebbles are common, especially near the surface where the till surface has weathered. The thickness varies, but it is more than 50 feet in places along the southeastern edge of the county. The Yorkville Till Member is bounded below by the yellowish brown Malden till, and above, in places, by the yellowish brown Haeger till and large deposits of sand and gravel. This till is dominant in the eastern part of the county.

The Malden Till Member is yellowish brown loam. This till is very similar in color to the Gilbert till. The two differ mainly in mineralogy and uniformity. The Malden till is higher in illite and is usually more uniform. In some areas Tiskilwa till lies immediately below the Malden till. In other areas it is underlain by Gilbert till.

The Gilbert till (an informal Member) is yellowish brown loam. This till is less uniform than the other tills in the county, and it occurs mainly in the northeast. It overlies the Tiskilwa till in some places, and is thought to be ablation till from the Tiskilwa. The thickness of this till varies, and locally it may contain sand and gravel deposits.

The till of the Tiskilwa Member is reddish brown loam, and it is the oldest exposed till in the county. It is uniform in texture and is commonly 100 to 150 feet thick in the area of its end moraine in the northwest quarter of the county. It thins rapidly, however, toward the southeast (fig. 13). This till is dominant in the northwestern part of the county, but small areas of it are variously located.

Glacial outwash deposits are variously located in the county (fig. 13). In many areas outwash deposits are less than 20 feet thick and overlie glacial till, but in some areas in the northeast corner of the county, they may be more than 80 feet thick. Glacial outwash, both stratified sand and silt and sand and gravel, account for the youngest glacial deposits. Many outwash areas occur in valleys separating till members. Outwash occurring in the form of knolls, ridges, kames, and eskers is usually the result of ice walled lakes and streams. After the ice melted, these distinctive landforms remained.

When the ice retreated to about the present headwaters of the Mississippi River, extreme climatic factors presented a situation similar to the "Dust Bowl" of the 1930's. Strong winds and decreased rainfall favored silts to be blown across the state from the Mississippi River valley. In addition, local river valleys may also have been loess sources. This windblown silt, or loess, covered most of the county west of the Fox River. The thickness of the loess varies from 5 feet in the southwestern part of the county to several inches in the eastern part.

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Glossary

Ablation till. Loose permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

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

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

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

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.

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-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

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

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

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).

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.

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.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most 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 "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May,* for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

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

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

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

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

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

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.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

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

Low strength. Inadequate strength for supporting loads.

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

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.

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, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse* more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

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.

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

Permafrost. Layers of soil, or even bedrock, occuring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

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).

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

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

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

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

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

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.

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.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 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.

Stone line. A concentration of coarse fragments in soils that generally marks an old weathering surface. In a cross section, the line may be one fragment or more thick. The line generally overlies material that weathered in place and marks the top of a paleosol. It is ordinarily overlain by recent sediment of variable thickness.

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.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

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.

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

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Illustrations

Figure 1.—Typical Will-Warsaw-Canisteo landscape. Will soils are in foreground, Canisteo soils are in wet depression, and Warsaw soils are on knolls in background.

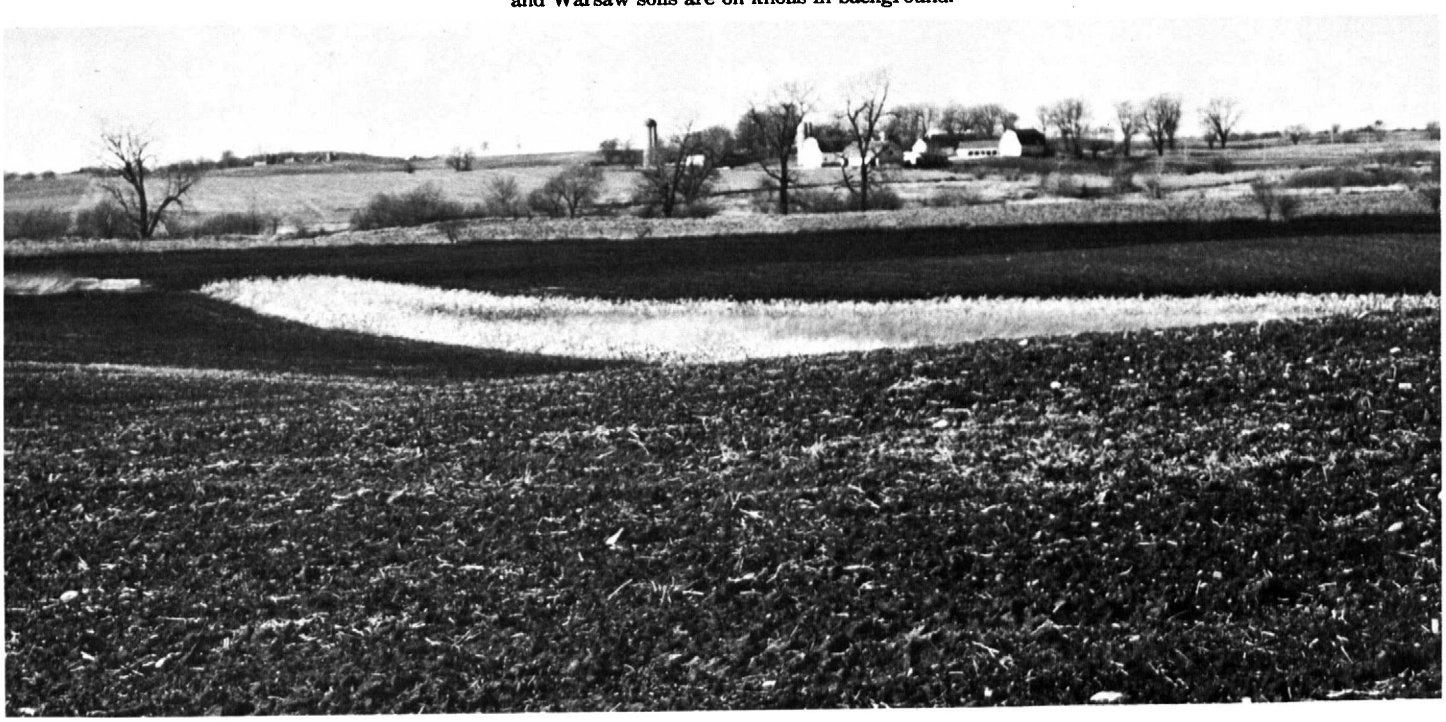

Figure 2.—Typical Waupecan-Drummer landscape. Waupecan soils are in foreground, and Drummer soils are in drainageway in background.

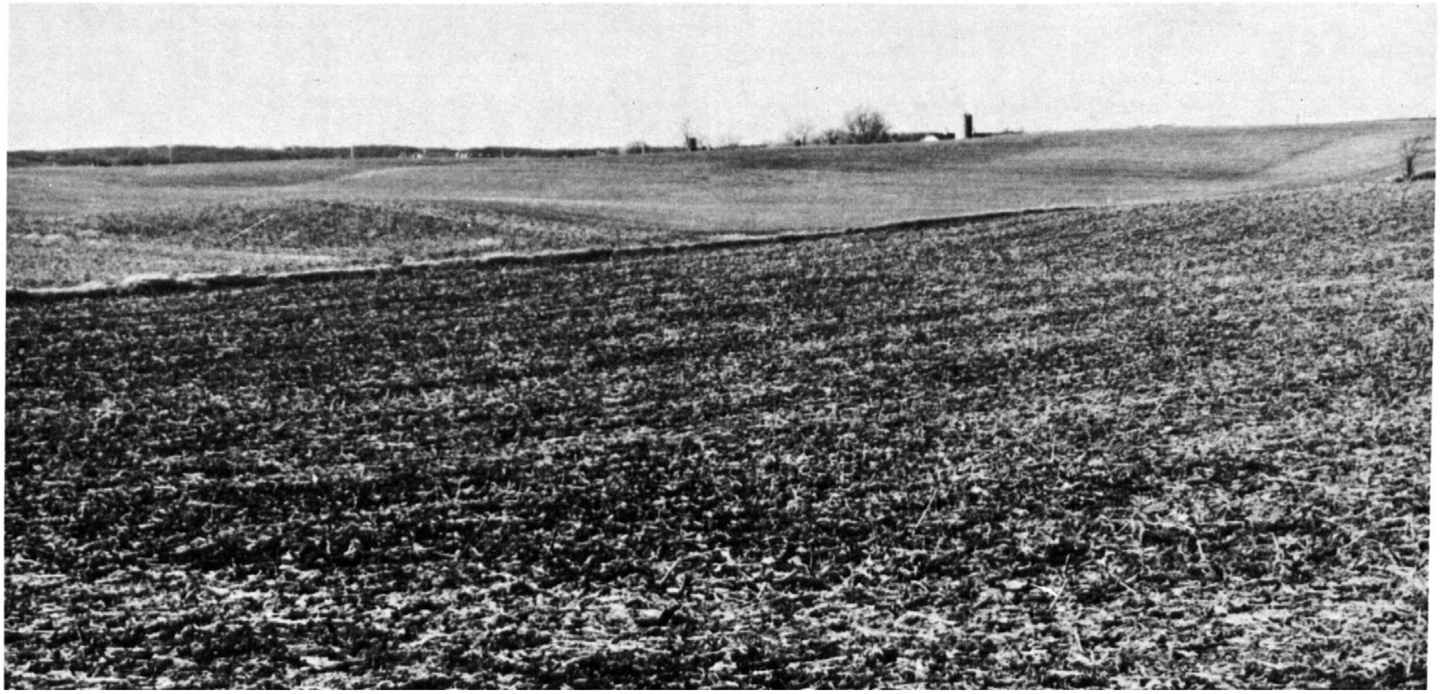

Figure 3.—Typical Drummer-Saybrook-Catlin landscape. Drummer soils are in foreground, Saybrook soils are on ridges and side slopes in background, and Catlin soils are on side slopes at right.

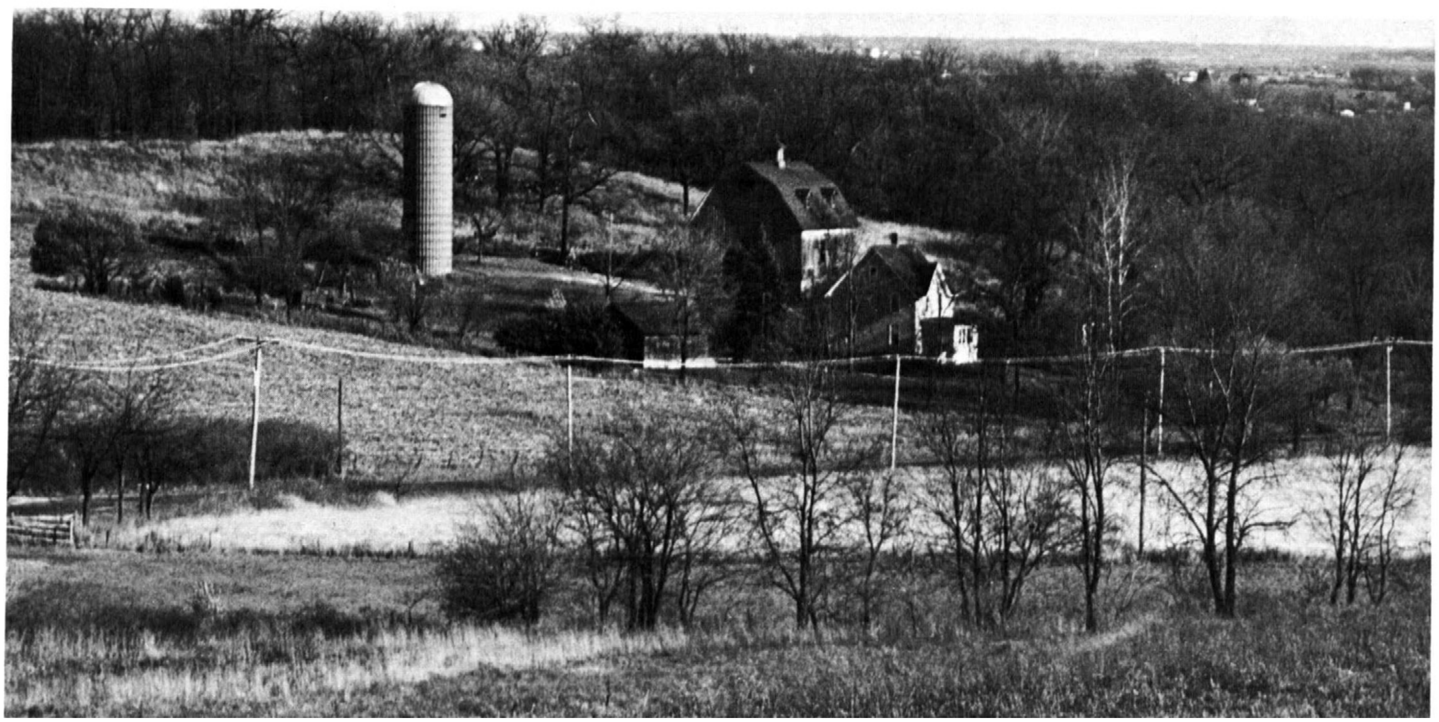

Figure 4.—Typical Miami-Octagon landscape. Miami and Casco soils are on ridges at left, and Octagon soils are in foreground.

Figure 5.—Landscape in Dodge-Birkbeck-Camden map unit. Dodge and Camden soils are on ridges in background; Birkbeck soils are in foreground.

Figure 6.—Landscape in Drummer-Harvard map unit. The dark Drummer soils are in low areas, and Harvard soils are on adjacent ridges and knolls.

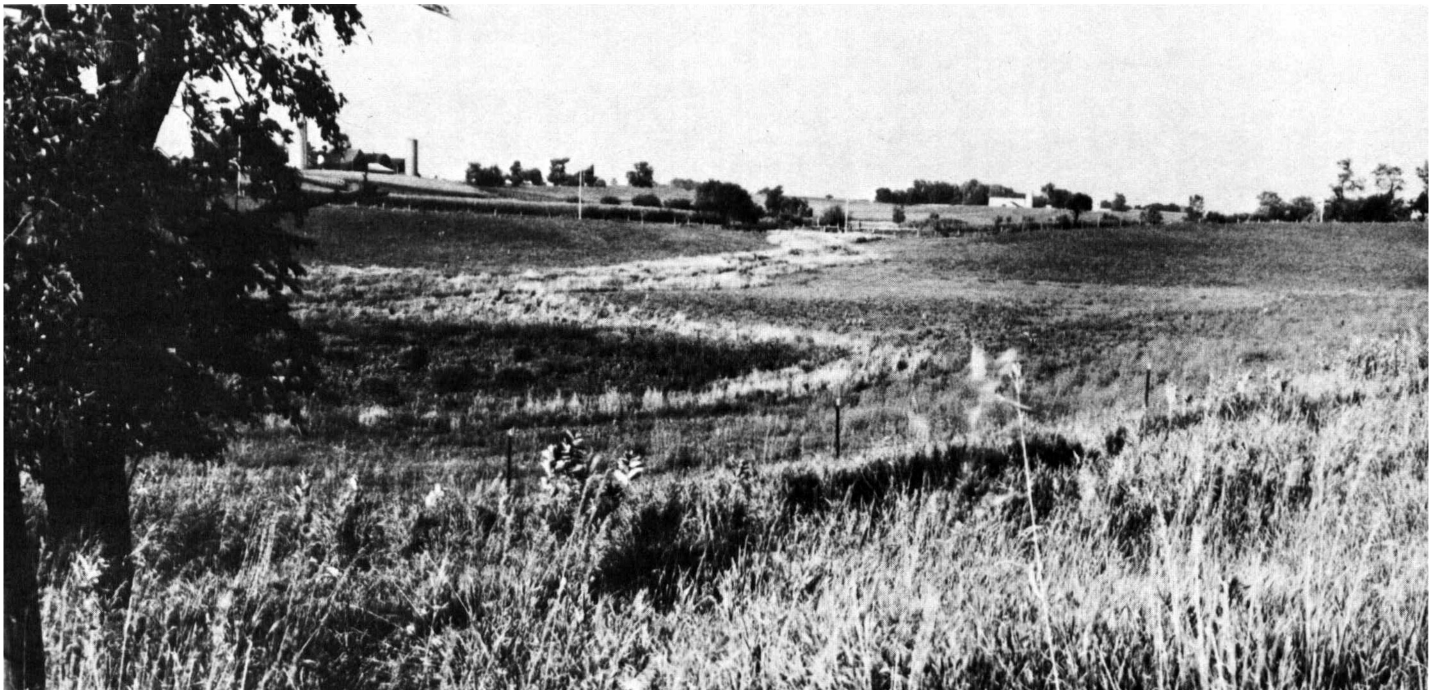

Figure 7.—Landscape in Milford-Varna-Markham map unit. Milford soils are in foreground and waterway; Varna and Markham soils are on ridges in background.

Figure 8.—Home on flood plain of Otter silt loam along Mill Creek.

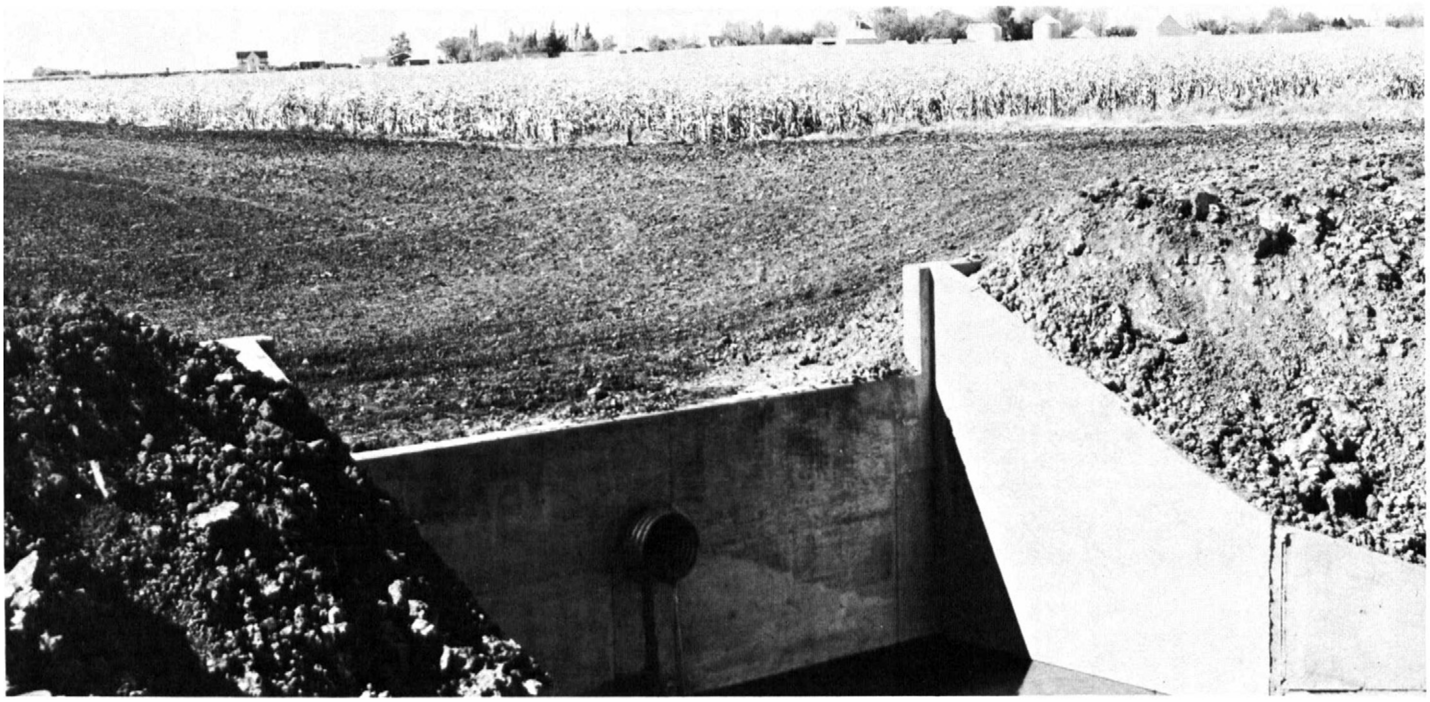

Figure 9.—Concrete straight-drop spillway at the end of a waterway on Drummer silty clay loam.

Figure 10.—Conical mounds, or kames, are distinctive in Kane County. Soil is Casco loam, 15 to 20 percent slopes.

Figure 11.—Forested kame in background is Miami-Casco complex, 10 to 20 percent slopes. This forest preserve has multiple recreation uses.

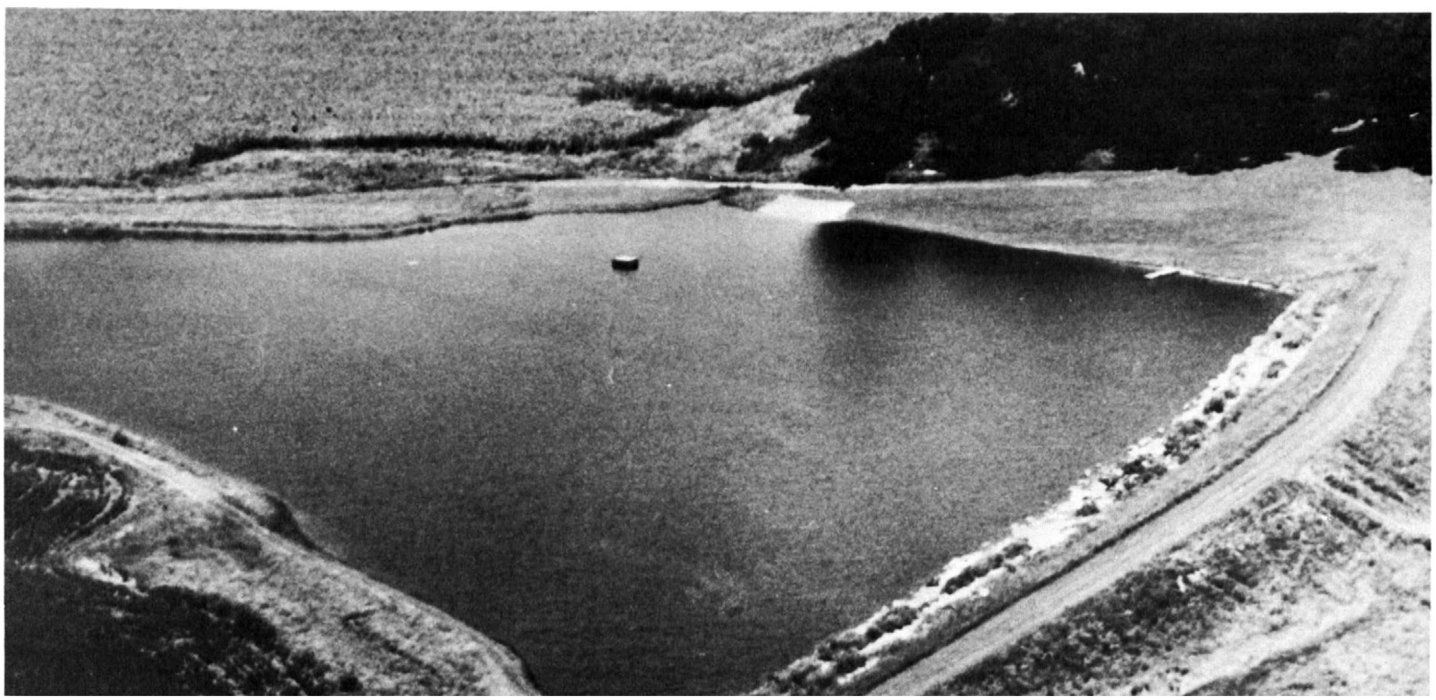

Figure 12.—Farm embankment pond on Drummer silty clay loam is useful for erosion control, recreation, and water for livestock.

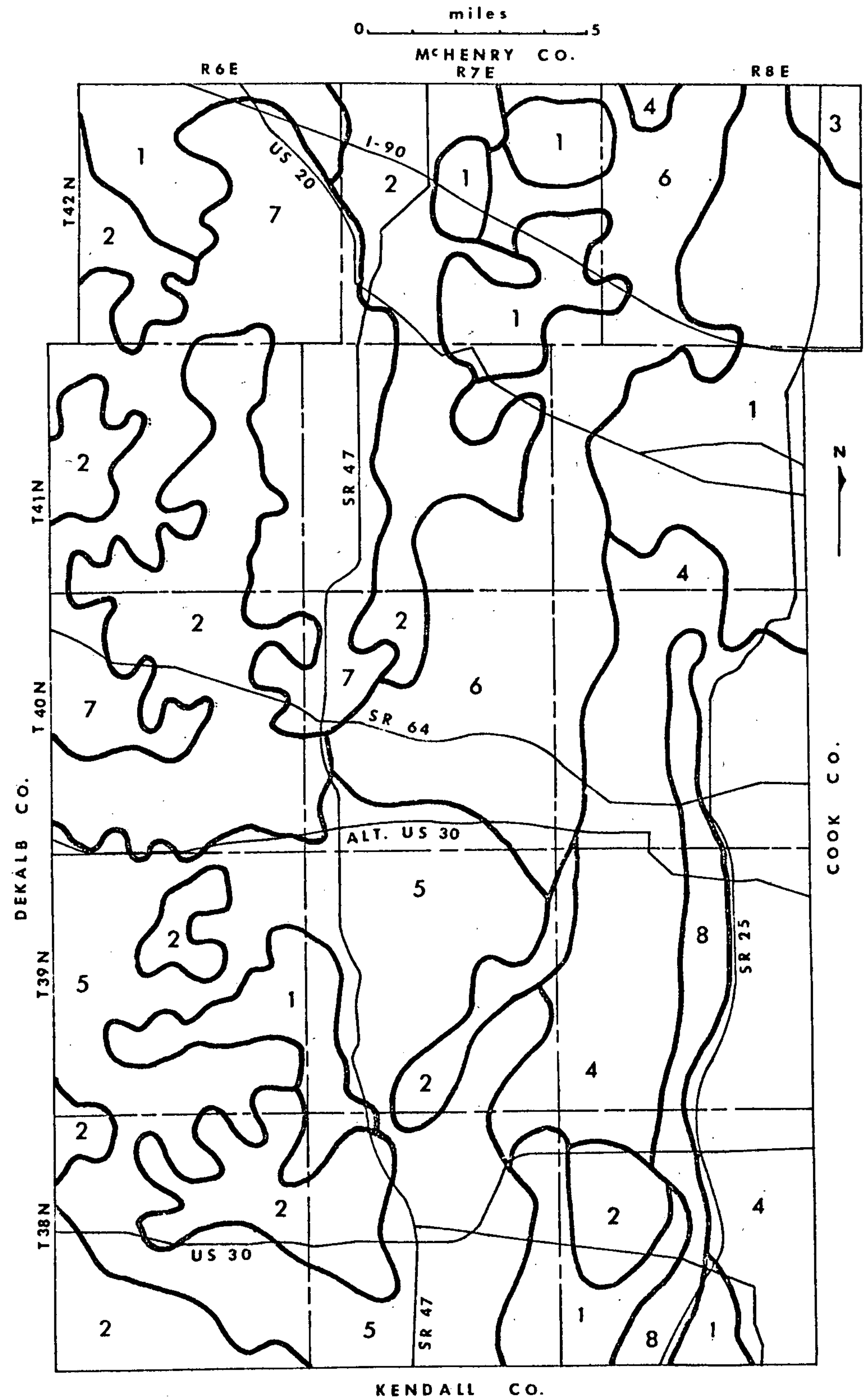

Figure 13.—Surficial geology map of Kane County.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Recorded in the period 1951-73 at Aurora, Ill.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximums higher than--	2 years in 10 will have-- Minimums lower than--	Average number of growing degree days[1]	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----	29.7	12.3	21.0	55	-20	10	1.73	.84	2.46	4	8.8
February---	34.5	16.8	25.7	58	-15	14	1.50	.70	2.15	4	6.2
March------	44.6	25.8	35.2	76	2	72	2.37	1.22	3.31	5	6.0
April------	60.0	37.8	48.9	84	19	274	3.61	2.40	4.69	7	.7
May--------	71.2	47.4	59.3	91	30	598	3.43	2.17	4.55	7	.0
June-------	81.1	57.6	69.4	96	40	882	4.13	2.76	5.38	7	.0
July-------	84.1	61.5	72.8	97	45	1,017	4.17	2.75	5.45	6	.0
August-----	82.7	60.0	71.4	94	45	973	3.39	1.39	5.00	5	.0
September--	76.2	52.4	64.3	93	33	729	3.25	1.41	4.74	5	.0
October----	65.1	41.6	53.4	87	21	427	2.81	.74	4.46	5	.2
November---	48.0	29.2	38.7	72	6	81	2.08	1.33	2.76	5	1.6
December---	34.8	18.4	26.6	63	-14	21	2.23	1.12	3.14	5	8.7
Year-----	59.3	38.4	48.9	98	-21	5,098	34.70	28.59	40.54	65	32.2

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-73 at Aurora, Ill.]

Probability	Temperature-- 24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 24	April 30	May 19
2 years in 10 later than--	April 20	April 26	May 13
5 years in 10 later than--	April 11	April 17	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	October 18	October 13	September 28
2 years in 10 earlier than--	October 22	October 17	October 2
5 years in 10 earlier than--	October 30	October 26	October 9

TABLE 3.--GROWING SEASON LENGTH

[Recorded in the period 1951-73 at Aurora, Ill.]

Probability	Daily minimum temperature during growing season: Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	182	172	138
8 years in 10	188	178	145
5 years in 10	201	191	161
2 years in 10	214	203	176
1 year in 10	221	210	184

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

Map symbol	Soil name	Acres	Percent
24B	Dodge silt loam, 2 to 5 percent slopes	9,539	2.9
24C2	Dodge silt loam, 5 to 10 percent slopes, eroded	2,234	0.7
27B	Miami silt loam, 2 to 5 percent slopes	6,284	1.9
27C2	Miami silt loam, 5 to 10 percent slopes, eroded	7,892	2.4
27D2	Miami silt loam, 10 to 15 percent slopes, eroded	3,605	1.1
27D3	Miami clay loam, 10 to 15 percent slopes, severely eroded	503	0.2
59	Lisbon silt loam	2,840	0.9
60C2	La Rose loam, 5 to 10 percent slopes, eroded	548	0.2
60D2	La Rose loam, 10 to 15 percent slopes, eroded	383	0.1
62	Herbert silt loam	2,526	0.8
67	Harpster silty clay loam	3,696	1.1
69	Milford silty clay loam	9,625	2.9
76	Otter silt loam	3,436	1.0
82	Millington loam	2,069	0.6
93F	Rodman soils, 15 to 30 percent slopes	2,064	0.6
103	Houghton muck	6,825	2.1
104	Virgil silt loam	3,257	1.0
105A	Batavia silt loam, 0 to 2 percent slopes	1,690	0.5
105B	Batavia silt loam, 2 to 5 percent slopes	1,727	0.5
125	Selma loam	1,649	0.5
134A	Camden silt loam, 0 to 2 percent slopes	907	0.3
134B	Camden silt loam, 2 to 5 percent slopes	4,831	1.5
134C2	Camden silt loam, 5 to 10 percent slopes, eroded	1,422	0.4
145A	Saybrook silt loam, 0 to 2 percent slopes	1,028	0.3
145B	Saybrook silt loam, 2 to 5 percent slopes	13,935	4.2
145C2	Saybrook silt loam, 5 to 10 percent slopes, eroded	1,605	0.5
146	Elliott silt loam	3,842	1.2
148A	Proctor silt loam, 0 to 2 percent slopes	2,472	0.7
148B	Proctor silt loam, 2 to 5 percent slopes	4,095	1.2
149	Brenton silt loam	7,660	2.3
152	Drummer silty clay loam	67,548	20.3
154	Flanagan silt loam	3,978	1.2
171A	Catlin silt loam, 0 to 2 percent slopes	1,786	0.5
171B	Catlin silt loam, 2 to 5 percent slopes	2,239	0.7
194B	Morley silt loam, 2 to 5 percent slopes	5,315	1.6
194C	Morley silt loam, 5 to 10 percent slopes	3,453	1.0
194D	Morley silt loam, 10 to 15 percent slopes	1,071	0.3
194E	Morley silt loam, 15 to 20 percent slopes	557	0.2
198	Elburn silt loam	6,074	1.8
199A	Plano silt loam, 0 to 2 percent slopes	2,173	0.7
199B	Plano silt loam, 2 to 5 percent slopes	817	0.2
206	Thorp silt loam	1,265	0.4
210	Lena muck	2,240	0.7
219	Millbrook silt loam	4,140	1.2
223B	Varna silt loam, 2 to 5 percent slopes	6,259	1.9
223C2	Varna silt loam, 5 to 10 percent slopes, eroded	591	0.2
233A	Birkbeck silt loam, 0 to 2 percent slopes	419	0.1
233B	Birkbeck silt loam, 2 to 5 percent slopes	1,253	0.4
233C2	Birkbeck silt loam, 5 to 10 percent slopes, eroded	214	(*)
236	Sabina silt loam	820	0.2
243A	St. Charles silt loam, 0 to 2 percent slopes	334	(*)
243B	St. Charles silt loam, 2 to 5 percent slopes	883	0.3
290A	Warsaw loam, 0 to 2 percent slopes	829	0.3
290B	Warsaw loam, 2 to 5 percent slopes	1,114	0.3
298	Beecher silt loam	4,153	1.3
318A	Lorenzo loam, 0 to 2 percent slopes	222	(*)
318B	Lorenzo loam, 2 to 5 percent slopes	1,006	0.3
318C2	Lorenzo clay loam, 5 to 10 percent slopes, eroded	1,125	0.3
323D	Casco loam, 10 to 15 percent slopes	1,175	0.4
323E	Casco loam, 15 to 20 percent slopes	350	0.1
325A	Dresden silt loam, 0 to 2 percent slopes	1,742	0.5
325B	Dresden silt loam, 2 to 5 percent slopes	7,566	2.3
325C	Dresden silt loam, 5 to 10 percent slopes	2,174	0.7
327A	Fox silt loam, 0 to 2 percent slopes	822	0.2
327B	Fox silt loam, 2 to 5 percent slopes	3,132	0.9
327C	Fox silt loam, 5 to 10 percent slopes	2,273	0.7
327D	Fox silt loam, 10 to 15 percent slopes	1,087	0.3
329	Will silty clay loam	2,842	0.9
330	Peotone silty clay loam	2,813	0.9

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
343	Kane silt loam	1,788	0.5
344A	Harvard silt loam, 0 to 2 percent slopes	1,632	0.5
344B	Harvard silt loam, 2 to 5 percent slopes	6,684	2.0
344C	Harvard silt loam, 5 to 10 percent slopes	1,594	0.5
347	Canisteo loam	1,308	0.4
361B	Kidder silt loam, 2 to 5 percent slopes	429	0.1
361C	Kidder silt loam, 5 to 10 percent slopes	398	0.1
361D	Kidder silt loam, 10 to 15 percent slopes	215	(*)
369A	Waupecan silt loam, 0 to 2 percent slopes	4,495	1.4
369B	Waupecan silt loam, 2 to 5 percent slopes	1,443	0.4
392	Urban land-Orthents, loamy, complex	2,817	0.9
442	Mundelein silt loam	2,671	0.8
531B	Markham silt loam, 2 to 5 percent slopes	3,868	1.2
531C2	Markham silt loam, 5 to 10 percent slopes, eroded	1,978	0.6
570B	Martinsville loam, 2 to 5 percent slopes	2,218	0.7
570C	Martinsville loam, 5 to 10 percent slopes	314	(*)
656B	Octagon silt loam, 2 to 5 percent slopes	7,943	2.4
656C2	Octagon silt loam, 5 to 10 percent slopes, eroded	5,939	1.8
656D2	Octagon silt loam, 10 to 15 percent slopes, eroded	1,203	0.4
696B	Zurich silt loam, 2 to 5 percent slopes	1,166	0.4
697	Wauconda silt loam	1,340	0.4
791A	Rush silt loam, 0 to 2 percent slopes	418	0.1
791B	Rush silt loam, 2 to 5 percent slopes	999	0.3
791C2	Rush silt loam, 5 to 10 percent slopes, eroded	297	(*)
792A	Bowes silt loam, 0 to 2 percent slopes	3,031	0.9
792B	Bowes silt loam, 2 to 5 percent slopes	2,281	0.7
792C	Bowes silt loam, 5 to 10 percent slopes	295	(*)
864	Pits, quarry, limestone	363	0.1
865	Pits, gravel	2,234	0.7
921B	Faxon-Ripon complex, 0 to 5 percent slopes	1,086	0.3
938C	Miami-Casco complex, 4 to 10 percent slopes	1,954	0.6
938E	Miami-Casco complex, 10 to 20 percent slopes	3,389	1.0
1103	Houghton muck, wet	574	0.2
	Water	2,393	0.7
	Total	332,800	100.0

* Less than 0.1 percent.

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

[All yields were estimated for a high level of management in 1976. 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	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Ton	AUM*
24B------------------------ Dodge	105	38	---	75	4.5	---
24C2----------------------- Dodge	95	35	---	60	4.0	---
27B------------------------ Miami	101	35	42	59	4.2	---
27C2----------------------- Miami	95	33	38	50	3.8	---
27D2----------------------- Miami	85	28	36	---	2.6	---
27D3----------------------- Miami	---	---	---	---	2.5	---
59------------------------- Lisbon	130	46	55	84	5.4	9.0
60C2----------------------- La Rose	100	35	42	63	4.2	6.9
60D2----------------------- La Rose	92	32	39	59	3.8	6.3
62------------------------- Herbert	122	40	49	74	4.9	8.1
67------------------------- Harpster	118	40	45	67	4.5	7.0
69------------------------- Milford	115	40	48	70	4.8	---
76------------------------- Otter	120	40	42	60	4.2	---
82------------------------- Millington	113	40	44	61	4.2	---
93F. Rodman						
103------------------------ Houghton	115	40	---	---	---	---
104------------------------ Virgil	129	45	52	76	5.1	---
105A----------------------- Batavia	125	42	51	78	5.0	8.3
105B----------------------- Batavia	120	39	48	74	4.9	8.1
125------------------------ Selma	118	40	46	69	4.5	---
134A----------------------- Camden	110	38	48	65	5.0	8.3

See footnote at end of table.

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

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Ton	AUM*
134B-----Camden	110	38	48	65	5.0	8.3
134C2-----Camden	100	35	40	55	4.5	7.0
145A-----Saybrook	121	42	52	76	5.1	8.5
145B-----Saybrook	119	41	51	75	5.0	8.4
145C2-----Saybrook	111	38	46	68	4.6	7.7
146-----Elliott	110	38	47	72	4.6	7.2
148A-----Proctor	125	40	51	80	5.0	8.3
148B-----Proctor	123	45	51	80	4.9	8.2
149-----Brenton	139	48	---	83	5.4	8.5
152-----Drummer	135	45	53	75	5.0	8.2
154-----Flanagan	141	47	58	84	5.5	9.1
171A, 171B-----Catlin	128	41	53	79	5.3	8.8
194B-----Morley	90	33	41	60	3.6	6.2
194C-----Morley	82	28	36	54	3.4	5.9
194D-----Morley	77	25	33	51	3.2	5.4
194E-----Morley	72	---	30	48	3.0	5.0
198-----Elburn	140	48	55	85	5.5	9.1
199A-----Plano	135	48	55	80	5.5	8.5
199B-----Plano	130	45	52	76	5.2	8.0
206-----Thorp	110	38	44	63	4.2	7.0
210-----Lena	109	37	---	---	---	---
219-----Millbrook	125	45	51	74	4.9	8.0
223B-----Varna	101	37	46	66	4.3	6.8

See footnote at end of table.

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

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Ton	AUM*
223C2 Varna	90	30	37	55	3.8	6.1
233A Birkbeck	107	37	48	64	4.5	7.5
233B Birkbeck	106	37	48	64	4.5	7.5
233C2 Birkbeck	99	33	44	58	4.0	6.8
236 Sabina	116	38	49	68	4.7	7.8
243A St. Charles	115	40	50	70	4.8	8.0
243B St. Charles	112	38	47	66	4.6	8.0
290A Warsaw	100	35	50	68	3.3	---
290B Warsaw	95	35	46	65	3.3	---
298 Beecher	101	35	44	65	4.1	6.6
318A Lorenzo	80	27	38	55	3.3	5.5
318B Lorenzo	78	26	36	53	3.2	5.3
318C2 Lorenzo	72	22	31	49	3.0	5.0
323D, 323E Casco	---	---	---	40	2.0	---
325A Dresden	96	33	---	63	4.1	6.8
325B Dresden	93	30	---	60	4.0	6.6
325C Dresden	88	28	---	55	3.8	6.1
327A Fox	90	32	45	75	3.0	---
327B Fox	85	30	42	70	3.0	---
327C Fox	80	28	38	65	2.5	---
327D Fox	75	25	32	60	2.5	---
329 Will	105	38	45	66	4.5	---
330 Peotone	107	38	37	53	3.8	---

See footnote at end of table.

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

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Ton	AUM*
343----- Kane	106	39	48	69	4.4	7.2
344A----- Harvard	115	37	47	71	4.7	7.8
344B----- Harvard	110	35	44	67	4.5	7.4
344C----- Harvard	105	33	41	63	4.3	7.0
347----- Canisteo	110	36	---	75	3.5	5.2
361B----- Kidder	115	37	47	80	4.5	---
361C----- Kidder	100	30	32	52	3.2	---
361D----- Kidder	85	---	---	70	3.5	---
369A----- Waupecan	130	45	---	75	5.0	---
369B----- Waupecan	115	40	48	68	4.5	---
392. Urban land						
442----- Mundelein	123	40	50	79	5.0	8.0
531B----- Markham	93	35	43	63	4.1	6.6
531C2----- Markham	85	29	35	56	3.7	6.0
570B----- Martinsville	120	42	48	---	4.0	---
570C----- Martinsville	110	38	44	---	3.6	---
656B----- Octagon	115	40	52	---	3.8	---
656C2----- Octagon	100	35	45	---	3.3	---
656D2----- Octagon	95	33	43	---	3.1	---
696B----- Zurich	102	33	43	63	4.3	7.1
697----- Wauconda	112	37	47	73	4.7	---
791A----- Rush	125	44	50	---	4.1	---
791B----- Rush	125	44	50	---	4.1	---

See footnote at end of table.

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

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa
	Bu	Bu	Bu	Bu	Ton	AUM*
791C2 Rush	120	42	48	---	4.0	---
792A Bowes	130	45	54	73	5.2	8.6
792B Bowes	120	40	50	70	5.0	8.3
792C Bowes	114	38	47	66	4.7	7.9
864**, 865**. Pits						
921B Faxon	85	---	---	67	3.2	---
938C. Miami						
938E Miami	---	---	---	---	2.4	---
1103. Houghton						

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

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

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; the symbol > means greater than. Absence of an entry means that trees of the height class do not normally grow on this soil]

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
24B, 24C2 Dodge	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
27B, 27C2, 27D2, 27D3 Miami	Silky dogwood	Late lilac, Persian lilac, autumn-olive, Tatarian honeysuckle, Amur privet.	Red pine, white spruce.	Eastern white pine, Norway spruce.	Green ash.
59 Lisbon	Gray dogwood	Autumn-olive, silky dogwood.	Amur maple, Russian-olive, Amur honeysuckle.	Norway spruce	Eastern white pine, Douglas-fir.
60C2, 60D2 La Rose	Gray dogwood	Autumn-olive, Amur honeysuckle.	Amur maple	Norway spruce, Douglas-fir, eastern white pine, red pine.	---
62 Herbert	---	Amur maple, silky dogwood, Russian-olive.	---	Douglas-fir, eastern white pine.	Norway spruce, white spruce.
67 Harpster	---	Silky dogwood, Amur maple, American cranberrybush.	Russian-olive, flowering dogwood.	Tamarack, green ash, black spruce.	---
69 Milford	Gray dogwood	Silky dogwood, forsythia, redosier dogwood, northern white-cedar, Amur honeysuckle.	Black spruce, Amur maple, tall purple willow, medium purple willow.	---	Eastern cottonwood, Lombardy poplar.
76 Otter	---	Redosier dogwood, northern white-cedar, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---
82 Millington	---	Silky dogwood, American cranberrybush.	Amur maple	---	Eastern cottonwood, black spruce, European larch.
93F* Rodman	Vanhoutte spirea	Autumn-olive, Tatarian honeysuckle, Amur honeysuckle, late lilac.	Red pine, eastern redcedar.	Eastern white pine, red pine, jack pine, Austrian pine.	---
103 Houghton	---	Silky dogwood, Vanhoutte spirea.	Laurel willow, Austrian pine.	Northern white-cedar, eastern white pine, Norway spruce.	Carolina poplar.
104 Virgil	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	White spruce, green ash.	Eastern white pine, silver maple, jack pine.	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
105A, 105B. Batavia	American cranberrybush.	Silky dogwood, autumn-olive.	Amur maple	Norway spruce	Douglas-fir, eastern white pine, red pine.
125. Selma	---	Amur maple, silky dogwood, American cranberrybush.	Flowering dogwood	Black spruce	Green ash, tamarack.
134A, 134B, 134C2. Camden	---	Autumn-olive, Amur honeysuckle, blackhaw, American cranberrybush, shadblow serviceberry.	Eastern hemlock	Norway spruce	Eastern white pine, red pine, Douglas-fir, honeylocust, blackgum.
145A, 145B, 145C2. Saybrook	Gray dogwood	Autumn-olive, forsythia.	Amur maple	Norway spruce, Douglas-fir, eastern white pine, red pine.	---
146. Elliott	---	Silky dogwood, autumn-olive, Amur honeysuckle.	Russian-olive	Red pine, Norway spruce, white spruce.	Eastern white pine.
148A, 148B. Proctor	Russian-olive	Autumn-olive, silky dogwood, Amur honeysuckle.	Amur maple	Norway spruce, red pine.	Douglas-fir, eastern white pine.
149. Brenton	Silky dogwood	Amur honeysuckle, autumn-olive, late lilac.	---	Red pine	Norway spruce, eastern white pine, white spruce.
152. Drummer	Gray dogwood, dwarf purple willow.	Silky dogwood, Amur honeysuckle, redosier dogwood.	Northern white-cedar, tall purple willow, medium purple willow.	---	Lombardy poplar.
154. Flanagan	Mockorange	European burningbush, late lilac, shadblow serviceberry, autumn-olive, Amur honeysuckle, blackhaw, American cranberrybush.	Eastern hemlock	---	Eastern white pine, Norway spruce, honeylocust.
171A, 171B. Catlin	---	Amur maple, silky dogwood, Amur honeysuckle.	Autumn-olive, Russian-olive.	Douglas-fir, eastern white pine, red pine.	Norway spruce.
194B, 194C, 194D, 194E. Morley	Mockorange	Amur honeysuckle, autumn-olive, late lilac, blackhaw, American cranberrybush.	Eastern redcedar	Eastern white pine, Norway spruce, red pine, Douglas-fir, eastern hemlock.	---
198. Elburn	Silky dogwood	Autumn-olive	Amur maple, Russian-olive.	Norway spruce	Eastern white pine, Douglas-fir.
199A, 199B. Plano	Gray dogwood	Autumn-olive, Amur honeysuckle.	---	Eastern white pine, red pine, Norway spruce, Douglas-fir.	---

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
206. Thorp	---	Silky dogwood, flowering dogwood, American cranberrybush.	Green ash, Amur maple.	---	Eastern cottonwood, American sycamore.
210. Lena	---	Silky dogwood, Amur maple.	---	Black spruce	Tamarack.
219. Millbrook	Silky dogwood	Autumn-olive, Amur honeysuckle.	Amur maple	Red pine	Eastern white pine, Norway spruce, white spruce.
223B, 223C2. Varna	Gray dogwood	Autumn-olive, Amur honeysuckle, late lilac.	Northern white-cedar.	Eastern white pine, Norway spruce, red pine.	---
233A, 233B, 233C2. Birkbeck	American cranberrybush.	Silky dogwood, Amur maple.	Russian-olive, autumn-olive.	Douglas-fir, white spruce, eastern white pine, red pine.	Norway spruce.
236. Sabina	Mockorange	Blackhaw, autumn-olive, late lilac, shadblow serviceberry, Amur honeysuckle, European burningbush.	White spruce, eastern hemlock.	---	Norway spruce, eastern white pine, honeylocust.
243A, 243B. St. Charles	Gray dogwood	Russian-olive, late lilac.	Amur maple	Red pine, Norway spruce.	Eastern white pine, Douglas-fir.
290A, 290B. Warsaw	Mockorange	European burningbush, blackhaw, late lilac, Amur honeysuckle, shadblow serviceberry, American cranberrybush, autumn-olive.	Eastern hemlock	Norway spruce	Eastern white pine, honeylocust.
298. Beecher	---	Silky dogwood, autumn-olive.	Norway spruce, Amur maple.	Douglas-fir, white spruce, Russian-olive.	Eastern white pine.
318A, 318B, 318C2. Lorenzo	Manyflower cotoneaster.	Lilac	Norway spruce, Siberian peashrub.	Jack pine, eastern white pine, red pine.	---
323D, 323E. Casco	American hazel, European privet.	Tamarisk, late lilac, forsythia, autumn-olive.	Austrian pine	Eastern white pine, red pine, jack pine.	---
325A, 325B, 325C. Dresden	---	---	---	---	Red pine, Norway spruce, white spruce, Douglas-fir.
327A, 327B, 327C, 327D. Fox	---	Autumn-olive, Amur honeysuckle, blackhaw, shadblow serviceberry, American cranberrybush, cornelian cherry dogwood.	---	Norway spruce, white spruce, American basswood.	Eastern white pine.

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
329 Will	---	Silky dogwood, American cranberrybush.	Green ash, Amur maple, flowering dogwood.	Black spruce, tamarack.	---
330 Peotone	Gray dogwood	Forsythia, Amur maple.	Black spruce	Tamarack	Green ash.
343 Kane	---	Amur maple, autumn-olive, silky dogwood, Amur honeysuckle, late lilac.	---	Eastern white pine, Norway spruce, Douglas-fir.	---
344A, 344B, 344C Harvard	Gray dogwood	Autumn-olive, forsythia.	Amur maple	Norway spruce	Douglas-fir, eastern white pine, red pine.
347. Canisteo					
361B, 361C, 361D Kidder	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
369A, 369B Waupecan	Silky dogwood, gray dogwood.	Forsythia, autumn-olive, late lilac, American cranberrybush.	Amur maple	Russian-olive	Eastern white pine, red pine, Douglas-fir, Norway spruce.
392*: Urban land.					
Orthents.					
442 Mundelein	---	Autumn-olive, Amur honeysuckle, lilac.	Russian-olive	Norway spruce, red pine.	Eastern white pine, Douglas-fir.
531B, 531C2 Markham	Gray dogwood	Autumn-olive, Amur honeysuckle, late lilac, American cranberrybush, blackhaw.	Northern white-cedar, eastern hemlock.	Eastern white pine, Norway spruce, red pine.	Honeylocust.
570B, 570C Martinsville	Mockorange	European burningbush, blackhaw, late lilac, Amur honeysuckle, shadblow serviceberry, American cranberrybush, autumn-olive.	Eastern hemlock	Norway spruce	Eastern white pine, honeylocust.
656B, 656C2, 656D2 Octagon	Mockorange	European burningbush, blackhaw, late lilac, Amur honeysuckle, shadblow serviceberry, American cranberrybush, autumn-olive.	Eastern hemlock	Norway spruce	Honeylocust, eastern white pine.

See footnote at end of table.

TABLE 6.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
696B: Zurich	---	Silky dogwood, American cranberrybush, Amur honeysuckle, lilac.	Autumn-olive, Amur maple, Russian-olive.	Eastern white pine, red pine, Norway spruce, white spruce, Douglas-fir.	---
697: Wauconda	---	Common ninebark, lilac, Amur honeysuckle.	Norway spruce, white spruce, northern white-cedar, Amur maple.	Red pine, eastern white pine, common hackberry, green ash.	---
791A, 791B, 791C2: Rush	Mockorange	European burningbush, blackhaw, late lilac, Amur honeysuckle, shadblow serviceberry, American cranberrybush, autumn-olive.	Eastern hemlock	Norway spruce, honeylocust.	Eastern white pine.
792A, 792B, 792C: Bowes	---	Autumn-olive, silky dogwood, Amur honeysuckle.	Amur maple	Norway spruce	Douglas-fir, eastern white pine, red pine.
864*, 865*. Pits					
921B*:					
Faxon	---	Tall purple willow, Tatarian honeysuckle, Siberian peashrub, redosier dogwood.	Russian-olive	---	Eastern cottonwood, golden willow.
Ripon	---	Northern white-cedar, lilac, common ninebark, silky dogwood.	White spruce, Norway spruce.	Eastern white pine, red pine.	---
938C*, 938E*:					
Miami	---	Blackhaw, late lilac, Amur honeysuckle, shadblow serviceberry, winged euonymus, American cranberrybush, autumn-olive.	Eastern hemlock, European burningbush.	Norway spruce	Eastern white pine, honeylocust.
Casco	American hazel, European privet.	Tamarisk, late lilac, forsythia, autumn-olive.	Austrian pine	Eastern white pine, red pine, jack pine.	---
1103: Houghton	Gray dogwood, dwarf purple willow.	Amur honeysuckle, redosier dogwood, silky dogwood.	Northern white-cedar, tall purple willow, medium purple willow.	---	Lombardy poplar.

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

TABLE 7.--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
24B Dodge	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
24C2 Dodge	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength, frost action.	Slight.
27B Miami	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
27C2 Miami	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
27D2 Miami	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
27D3 Miami	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: too clayey, slope.
59 Lisbon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
60C2 La Rose	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Severe: low strength.	Slight.
60D2 La Rose	Moderate: slope.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
62 Herbert	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
67 Harpster	Severe: wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: wetness, frost action, low strength.	Severe: wetness.
69 Milford	Severe: wetness, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: low strength, wetness, floods.	Severe: wetness.
76 Otter	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, low strength.	Slight.
82 Millington	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.

See footnote at end of table.

TABLE 7.--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
93F*: Rodman	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
103: Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: excess humus, wetness, floods.
104: Virgil	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
105A, 105B: Batavia	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
125: Selma	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action, floods.	Severe: wetness.
134A, 134B: Camden	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
134C2: Camden	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: frost action, low strength.	Slight.
145A, 145B: Saybrook	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
145C2: Saybrook	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
146: Elliott	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: frost action, low strength.	Moderate: wetness.
148A, 148B: Proctor	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
149: Brenton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
152: Drummer	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
154: Flanagan	Severe: wetness.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, shrink-swell, low strength.	Severe: shrink-swell, wetness.	Severe: frost action, shrink-swell, low strength.	Moderate: wetness.
171A, 171B: Catlin	Moderate: wetness.	Moderate: low strength, shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: frost action, low strength.	Slight.
194B: Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 7.--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
194C-------------- Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength, slope.	Severe: low strength.	Slight.
194D-------------- Morley	Moderate: too clayey, slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, shrink-swell, wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
194E-------------- Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
198--------------- Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
199A, 199B-------- Plano	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
206--------------- Thorp	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods, low strength.	Severe: wetness.
210--------------- Lena	Severe: wetness, floods, excess humus.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: excess humus, wetness, floods.
219--------------- Millbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness, low strength.	Moderate: wetness.
223B-------------- Varna	Slight---------	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
223C2------------- Varna	Slight---------	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength, slope.	Severe: low strength, frost action.	Slight.
233A, 233B-------- Birkbeck	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
233C2------------- Birkbeck	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
236--------------- Sabina	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
243A, 243B-------- St. Charles	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
290A, 290B-------- Warsaw	Severe: cutbanks cave.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Severe: low strength.	Slight.
298--------------- Beecher	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.

See footnote at end of table.

TABLE 7.--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
318A, 318B-------- Lorenzo	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
318C2------------- Lorenzo	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: too clayey.
323D-------------- Casco	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
323E-------------- Casco	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
325A, 325B-------- Dresden	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
325C-------------- Dresden	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
327A, 327B-------- Fox	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
327C-------------- Fox	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
327D-------------- Fox	Severe: cutbanks cave.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
329--------------- Will	Severe: wetness, floods, cutbanks cave.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, low strength.	Severe: wetness.
330--------------- Peotone	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, low strength.	Severe: wetness.
343--------------- Kane	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
344A, 344B-------- Harvard	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
344C-------------- Harvard	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
347--------------- Canisteo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Moderate: wetness.
361B-------------- Kidder	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
361C-------------- Kidder	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 7.--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
361D: Kidder	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
369A, 369B: Waupecan	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength, frost action.	Slight.
392*:						
Urban land.						
Orthents.						
442: Mundelein	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
531B: Markham	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
531C2: Markham	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, low strength, slope.	Severe: frost action, low strength.	Slight.
570B: Martinsville	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
570C: Martinsville	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
656B: Octagon	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.	Slight.
656C2: Octagon	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
656D2: Octagon	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.	Moderate: slope.
696B: Zurich	Moderate: wetness.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
697: Wauconda	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength, wetness.	Moderate: wetness.
791A, 791B, 791C2: Rush	Severe: cutbanks cave.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: frost action, low strength.	Slight.
792A, 792B: Bowes	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.

See footnote at end of table.

TABLE 7.--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
792C Bowes	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
864*, 865*. Pits						
921B*:						
Faxon	Severe: wetness, floods, depth to rock.	Severe: wetness, floods.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
Ripon	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: frost action.	Moderate: thin layer.
938C*:						
Miami	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.	Slight.
Casco	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
938E*:						
Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Casco	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
1103 Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: excess humus, wetness, floods.

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

TABLE 8.--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," 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
24B Dodge	Slight	Moderate: slope, seepage.
24C2 Dodge	Slight	Severe: slope.
27B Miami	Moderate: percs slowly.	Moderate: seepage, slope.
27C2, 27D2, 27D3 Miami	Moderate: percs slowly.	Severe: slope.
59 Lisbon	Severe: wetness.	Severe: wetness.
60C2 La Rose	Moderate: percs slowly.	Severe: slope.
60D2 La Rose	Moderate: slope, percs slowly.	Severe: slope.
62 Herbert	Severe: wetness.	Severe: wetness.
67 Harpster	Severe: wetness, floods.	Severe: wetness.
69 Milford	Severe: wetness, percs slowly, floods.	Severe: floods, wetness.
76 Otter	Severe: wetness, floods.	Severe: floods, wetness.
82 Millington	Severe: floods, wetness.	Severe: wetness.
93F* Rodman	Severe: slope.	Severe: seepage, slope.
103 Houghton	Severe: wetness, floods.	Severe: wetness, seepage, floods.
104 Virgil	Severe: percs slowly, wetness.	Severe: wetness, seepage.
105A, 105B Batavia	Slight	Severe: seepage.
125 Selma	Severe: wetness, floods.	Severe: seepage, wetness.
134, 134B Camden	Slight	Severe: seepage.
134C2 Camden	Slight	Severe: seepage, slope.
145A Saybrook	Moderate: percs slowly, wetness.	Moderate: seepage, wetness.
145B Saybrook	Moderate: percs slowly, wetness.	Moderate: slope, seepage, wetness.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas
145C2 Saybrook	Moderate: percs slowly, wetness.	Severe: slope.
146 Elliott	Severe: wetness, percs slowly.	Severe: wetness.
148A, 148B Proctor	Slight	Severe: seepage.
149 Brenton	Severe: wetness.	Severe: wetness.
152 Drummer	Severe: wetness, floods.	Severe: wetness, floods.
154 Flanagan	Severe: wetness.	Severe: wetness.
171A Catlin	Severe: wetness.	Moderate: seepage, wetness.
171B Catlin	Severe: wetness.	Moderate: seepage, slope, wetness.
194B Morley	Severe: percs slowly, wetness.	Severe: wetness.
194C, 194D Morley	Severe: percs slowly, wetness.	Severe: slope, wetness.
194E Morley	Severe: percs slowly, slope, wetness.	Severe: slope, wetness.
198 Elburn	Severe: wetness.	Severe: wetness, seepage.
199A Plano	Slight	Severe: seepage.
199B Plano	Slight	Moderate: seepage, slope.
206 Thorp	Severe: wetness, floods, percs slowly.	Severe: wetness, seepage, floods.
210 Lena	Severe: wetness, floods.	Severe: wetness, excess humus, seepage.
219 Millbrook	Severe: wetness, percs slowly.	Severe: wetness.
223B Varna	Severe: percs slowly, wetness.	Moderate: slope.
223C2 Varna	Severe: percs slowly, wetness.	Severe: slope.
233A, 233B Birkbeck	Severe: wetness.	Severe: wetness.
233C2 Birkbeck	Severe: wetness.	Severe: slope, wetness.
236 Sabina	Severe: percs slowly, wetness.	Severe: wetness.
243A, 243B St. Charles	Slight	Severe: seepage.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas
290A, 290B Warsaw	Slight	Severe: seepage.
298 Beecher	Severe: wetness, percs slowly.	Slight.
318A, 318B Lorenzo	Slight	Severe: seepage.
318C2 Lorenzo	Slight	Severe: slope, seepage.
323D Casco	Moderate: slope.	Severe: seepage, slope.
323E Casco	Severe: slope.	Severe: seepage, slope.
325A, 325B Dresden	Slight	Severe: seepage.
325C Dresden	Slight	Severe: seepage, slope.
327A, 327B Fox	Slight	Severe: seepage.
327C Fox	Slight	Severe: seepage, slope.
327D Fox	Moderate: slope.	Severe: seepage, slope.
329 Will	Severe: wetness, floods.	Severe: wetness, seepage.
330 Peotone	Severe: percs slowly, wetness.	Slight.
343 Kane	Severe: wetness.	Severe: wetness, seepage.
344A, 344B Harvard	Moderate: wetness.	Severe: seepage.
344C Harvard	Moderate: wetness.	Severe: seepage, slope.
347 Canisteo	Severe: wetness, floods.	Severe: wetness.
361B Kidder	Slight	Severe: seepage.
361C Kidder	Slight	Severe: seepage, slope.
361D Kidder	Moderate: slope.	Severe: seepage, slope.
369A, 369B Waupecan	Slight	Severe: seepage.
392*: Urban land.		
Orthents.		
442 Mundelein	Severe: wetness, percs slowly.	Severe: wetness.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas
531B Markham	Severe: percs slowly, wetness.	Moderate: slope.
531C2 Markham	Severe: percs slowly, wetness.	Severe: slope.
570B Martinsville	Slight	Severe: seepage.
570C Martinsville	Slight	Severe: seepage, slope.
656B Octagon	Moderate: percs slowly.	Moderate: slope, seepage.
656C2 Octagon	Moderate: percs slowly.	Severe: slope.
656D2 Octagon	Moderate: percs slowly, slope.	Severe: slope.
696B Zurich	Moderate: wetness.	Severe: seepage.
697 Wauconda	Severe: wetness.	Severe: seepage, wetness.
791A, 791B, 791C2 Rush	Moderate: percs slowly.	Severe: seepage.
792A, 792B Bowes	Slight	Severe: seepage.
792C Bowes	Slight	Severe: seepage, slope.
864*, 865*. Pits		
921B*:		
Faxon	Severe: wetness, depth to rock, floods.	Severe: wetness, depth to rock, floods.
Ripon	Severe: depth to rock.	Severe: depth to rock.
938C*:		
Miami	Moderate: percs slowly.	Severe: slope.
Casco	Slight	Severe: seepage, slope.
938E*:		
Miami	Severe: percs slowly, slope.	Severe: slope.
Casco	Severe: slope.	Severe: seepage, slope.
1103 Houghton	Severe: wetness, floods.	Severe: wetness, seepage, floods.

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

TABLE 9.--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," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
24B, 24C2------------- Dodge	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
27B, 27C2------------- Miami	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
27D2------------------ Miami	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
27D3------------------ Miami	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
59-------------------- Lisbon	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
60C2------------------ La Rose	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
60D2------------------ La Rose	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
62-------------------- Herbert	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
67-------------------- Harpster	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
69-------------------- Milford	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
76-------------------- Otter	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
82-------------------- Millington	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
93F*------------------ Rodman	Fair: slope.	Good	Good	Poor: small stones, slope.
103------------------- Houghton	Poor: wetness, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
104------------------- Virgil	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
105A, 105B------------ Batavia	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
125------------------- Selma	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
134A, 134B, 134C2----- Camden	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
145A, 145B, 145C2----- Saybrook	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
146------------------- Elliott	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
148A, 148B------------ Proctor	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
149------------------- Brenton	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
152------------------- Drummer	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
154------------------- Flanagan	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
171A, 171B------------ Catlin	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
194B, 194C------------ Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
194D------------------ Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
194E------------------ Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
198------------------- Elburn	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
199A, 199B------------ Plano	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
206------------------- Thorp	Poor: wetness, low strength.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.
210------------------- Lena	Poor: low strength, wetness.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
219------------------- Millbrook	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
223B, 223C2----------- Varna	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
233A, 233B, 233C2----- Birkbeck	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
236------------------- Sabina	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
243A, 243B------------ St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
290A, 290B: Warsaw	Fair: low strength.	Good	Good	Good.
298: Beecher	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
318A, 318B, 318C2: Lorenzo	Good	Fair: excess fines.	Fair: excess fines.	Fair: too clayey.
323D: Casco	Good	Good	Good	Fair: thin layer, slope.
323E: Casco	Fair: slope.	Good	Good	Poor: slope.
325A, 325B, 325C: Dresden	Good	Good	Good	Fair: thin layer.
327A, 327B, 327C: Fox	Good	Good	Good	Fair: thin layer.
327D: Fox	Good	Good	Good	Fair: thin layer, slope.
329: Will	Poor: wetness, low strength.	Good	Good	Poor: wetness.
330: Peotone	Poor: shrink-swell, wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
343: Kane	Poor: wetness.	Good	Good	Fair: thin layer.
344A, 344B, 344C: Harvard	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
347: Canisteo	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
361B, 361C: Kidder	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
361D: Kidder	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
369A, 369B: Waupecan	Good	Good	Good	Fair: thin layer.
392*:				
Urban land.				
Orthents.				
442: Mundelein	Poor: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
531B, 531C2: Markham	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
570B, 570C------------ Martinsville	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
656B, 656C2----------- Octagon	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
656D2----------------- Octagon	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
696B------------------ Zurich	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
697------------------- Wauconda	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
791A, 791B, 791C2----- Rush	Poor: low strength.	Good-----------------	Good-----------------	Fair: thin layer.
792A, 792B, 792C------ Bowes	Poor: low strength.	Good-----------------	Good-----------------	Fair: thin layer.
864*, 865*. Pits				
921B*:				
Faxon----------------	Poor: wetness, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Ripon----------------	Poor: area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
938C*:				
Miami----------------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Casco----------------	Good-----------------	Good-----------------	Good-----------------	Fair: thin layer.
938E*:				
Miami----------------	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Casco----------------	Fair: slope.	Good-----------------	Good-----------------	Poor: slope.
1103------------------ Houghton	Poor: wetness, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.

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

TABLE 10.--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	Drainage	Irrigation	Terraces and diversions	Grassed waterways
24B Dodge	Seepage	Piping	Not needed	Erodes easily	Favorable	Erodes easily.
24C2 Dodge	Seepage slope.	Piping	Not needed	Slope, erodes easily.	Favorable	Erodes easily.
27B Miami	Seepage	Piping	Not needed	Erodes easily	Favorable	Erodes easily.
27C2 Miami	Slope, seepage.	Piping	Not needed	Slope, erodes easily.	Favorable	Erodes easily.
27D2, 27D3 Miami	Slope, seepage.	Piping	Not needed	Slope, erodes easily.	Slope	Slope, erodes easily.
59 Lisbon	Seepage	Wetness	Frost action	Wetness	Not needed	Wetness.
60C2 La Rose	Slope, seepage.	Favorable	Not needed	Slope	Favorable	Favorable.
60D2 La Rose	Slope, seepage.	Favorable	Not needed	Slope	Slope	Slope.
62 Herbert	Seepage	Wetness	Frost action	Wetness	Not needed	Wetness, erodes easily.
67 Harpster	Seepage	Hard to pack, wetness.	Frost action, floods.	Wetness, floods.	Not needed	Wetness.
69 Milford	Favorable	Wetness	Floods, frost action.	Wetness, slow intake, floods.	Not needed	Wetness.
76 Otter	Seepage	Wetness	Floods, frost action.	Wetness, floods.	Not needed	Wetness.
82 Millington	Seepage	Wetness	Floods, frost action.	Wetness, floods.	Not needed	Wetness.
93F* Rodman	Slope, seepage.	Seepage	Not needed	Slope, droughty.	Slope, too sandy.	Slope, droughty.
103 Houghton	Seepage	Excess humus, low strength.	Frost action, excess humus.	Soil blowing, wetness, floods.	Not needed	Wetness.
104 Virgil	Seepage	Wetness	Frost action	Wetness, erodes easily.	Not needed	Wetness, erodes easily.
105A Batavia	Seepage	Favorable	Not needed	Favorable	Not needed	Erodes easily.
105B Batavia	Seepage	Favorable	Not needed	Favorable	Erodes easily	Erodes easily.
125 Selma	Seepage	Wetness	Floods, frost action.	Wetness, floods.	Not needed	Wetness.
134A Camden	Seepage	Favorable	Not needed	Erodes easily	Not needed	Erodes easily.
134B Camden	Seepage	Favorable	Not needed	Erodes easily	Favorable	Erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
134C2 Camden	Seepage	Favorable	Not needed	Slope, erodes easily.	Favorable	Erodes easily.
145A Saybrook	Seepage	Favorable	Not needed	Favorable	Not needed	Erodes easily.
145B Saybrook	Seepage	Favorable	Not needed	Favorable	Erodes easily	Erodes easily.
145C2 Saybrook	Slope, seepage.	Favorable	Not needed	Slope	Erodes easily	Erodes easily.
146 Elliott	Favorable	Wetness, hard to pack.	Frost action	Wetness	Not needed	Wetness.
148A Proctor	Seepage	Favorable	Not needed	Favorable	Favorable	Erodes easily.
148B Proctor	Seepage	Favorable	Not needed	Favorable	Erodes easily	Erodes easily.
149 Brenton	Seepage	Wetness	Frost action	Wetness	Not needed	Wetness.
152 Drummer	Seepage	Wetness	Frost action, floods.	Wetness, floods.	Not needed	Wetness.
154 Flanagan	Seepage	Wetness, hard to pack.	Frost action	Wetness	Not needed	Wetness, erodes easily.
171A Catlin	Seepage	Hard to pack	Not needed	Favorable	Not needed	Erodes easily.
171B Catlin	Seepage	Hard to pack	Not needed	Favorable	Erodes easily	Erodes easily.
194B Morley	Favorable	Favorable	Not needed	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
194C Morley	Favorable	Favorable	Not needed	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
194D, 194E Morley	Favorable	Favorable	Not needed	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
198 Elburn	Seepage	Wetness	Frost action	Wetness	Not needed	Wetness, erodes easily.
199A Plano	Seepage	Favorable	Not needed	Favorable	Not needed	Erodes easily.
199B Plano	Seepage	Favorable	Not needed	Favorable	Erodes easily	Erodes easily.
206 Thorp	Seepage	Wetness	Floods, percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Not needed	Wetness, erodes easily, percs slowly.
210 Lena	Seepage	Excess humus, wetness.	Frost action, floods, excess humus.	Wetness, soil blowing.	Not needed	Wetness.
219 Millbrook	Seepage	Wetness	Frost action	Wetness	Not needed	Wetness, erodes easily.
223B Varna	Favorable	Favorable	Not needed	Favorable	Percs slowly	Percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
223C2------------- Varna	Slope, seepage.	Favorable-----	Not needed-----	Slope----------	Percs slowly---	Percs slowly.
233A-------------- Birkbeck	Seepage-------	Wetness-------	Frost action---	Favorable------	Not needed-----	Erodes easily.
233B-------------- Birkbeck	Seepage-------	Wetness-------	Frost action---	Slope, erodes easily.	Wetness--------	Erodes easily.
233C2------------- Birkbeck	Slope, seepage.	Wetness-------	Frost action, slope.	Slope, erodes easily.	Wetness--------	Erodes easily.
236--------------- Sabina	Seepage-------	Wetness-------	Frost action---	Wetness, erodes easily.	Not needed-----	Erodes easily, wetness.
243A-------------- St. Charles	Seepage-------	Favorable-----	Not needed-----	Erodes easily--	Not needed-----	Erodes easily.
243B-------------- St. Charles	Seepage-------	Favorable-----	Not needed-----	Erodes easily--	Favorable------	Erodes easily.
290A-------------- Warsaw	Seepage-------	Seepage-------	Not needed-----	Favorable------	Not needed-----	Favorable.
290B-------------- Warsaw	Seepage-------	Seepage-------	Not needed-----	Favorable------	Too sandy------	Favorable.
298--------------- Beecher	Favorable-----	Wetness-------	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Not needed-----	Erodes easily, percs slowly, wetness.
318A-------------- Lorenzo	Seepage-------	Seepage-------	Not needed-----	Droughty-------	Not needed-----	Droughty.
318B-------------- Lorenzo	Seepage-------	Seepage-------	Not needed-----	Droughty-------	Too sandy------	Droughty.
318C2------------- Lorenzo	Seepage-------	Seepage-------	Not needed-----	Droughty, slope.	Too sandy------	Droughty.
323D, 323E-------- Casco	Seepage-------	Seepage-------	Not needed-----	Droughty, slope.	Slope, too sandy.	Droughty, slope.
325A-------------- Dresden	Seepage-------	Seepage-------	Not needed-----	Favorable------	Not needed-----	Favorable.
325B-------------- Dresden	Seepage-------	Seepage-------	Not needed-----	Favorable------	Too sandy------	Favorable.
325C-------------- Dresden	Seepage-------	Seepage-------	Not needed-----	Slope----------	Too sandy------	Favorable.
327A-------------- Fox	Seepage-------	Seepage-------	Not needed-----	Erodes easily--	Not needed-----	Erodes easily.
327B-------------- Fox	Seepage-------	Seepage-------	Not needed-----	Erodes easily--	Too sandy------	Erodes easily.
327C-------------- Fox	Seepage, slope.	Seepage-------	Not needed-----	Slope, erodes easily.	Too sandy------	Erodes easily.
327D-------------- Fox	Seepage, slope.	Seepage-------	Not needed-----	Slope, erodes easily.	Slope, too sandy.	Slope, erodes easily.
329--------------- Will	Seepage-------	Seepage-------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.

See footnote at end of table.

TABLE 10--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
330 Peotone	Favorable	Wetness, hard to pack.	Percs slowly, floods, frost action.	Wetness, percs slowly, floods.	Not needed	Wetness.
343 Kane	Seepage	Seepage	Frost action	Wetness	Not needed	Wetness.
344A Harvard	Seepage	Piping	Not needed	Favorable	Not needed	Erodes easily.
344B Harvard	Seepage	Piping	Not needed	Favorable	Erodes easily	Erodes easily.
344C Harvard	Slope, seepage.	Piping	Not needed	Slope	Erodes easily	Erodes easily.
347 Canisteo	Seepage	Wetness	Frost action	Wetness, floods.	Not needed	Wetness.
361B Kidder	Seepage	Seepage	Not needed	Favorable	Favorable	Favorable.
361C Kidder	Seepage, slope.	Seepage	Not needed	Slope	Favorable	Favorable.
361D Kidder	Seepage, slope.	Seepage	Not needed	Slope	Slope	Slope.
369A Waupecan	Seepage	Seepage	Not needed	Favorable	Not needed	Erodes easily.
369B Waupecan	Seepage	Seepage	Not needed	Favorable	Too sandy, erodes easily.	Erodes easily.
392*:						
Urban land.						
Orthents.						
442 Mundelein	Seepage	Piping	Frost action	Wetness	Not needed	Wetness, erodes easily.
531B Markham	Favorable	Favorable	Not needed	Erodes easily, percs slowly.	Percs slowly	Erodes easily, percs slowly.
531C2 Markham	Slope	Favorable	Not needed	Erodes easily, slope, percs slowly.	Percs slowly	Erodes easily, percs slowly.
570B Martinsville	Seepage	Favorable	Not needed	Favorable	Favorable	Erodes easily.
570C Martinsville	Slope, seepage.	Favorable	Not needed	Slope	Favorable	Erodes easily.
656B Octagon	Seepage	Favorable	Not needed	Favorable	Favorable	Favorable.
656C2 Octagon	Slope, seepage.	Favorable	Not needed	Slope	Favorable	Favorable.
656D2 Octagon	Slope, seepage.	Favorable	Not needed	Slope	Slope	Slope.
696B Zurich	Seepage	Piping	Not needed	Erodes easily	Favorable	Erodes easily.
697 Wauconda	Seepage	Piping, wetness.	Frost action	Wetness	Not needed	Wetness, erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
791A Rush	Seepage	Hard to pack	Not needed	Erodes easily	Not needed	Erodes easily.
791B, 791C2 Rush	Seepage	Hard to pack	Not needed	Erodes easily	Favorable	Erodes easily.
792A Bowes	Seepage	Favorable	Not needed	Favorable	Not needed	Erodes easily.
792B Bowes	Seepage	Favorable	Not needed	Favorable	Too sandy, erodes easily.	Erodes easily.
792C Bowes	Slope, seepage.	Favorable	Not needed	Slope	Too sandy, erodes easily.	Erodes easily.
864*, 865* Pits						
921B*:						
Faxon	Depth to rock	Thin layer, wetness.	Depth to rock, frost action.	Wetness, rooting depth.	Not needed	Wetness, depth to rock.
Ripon	Depth to rock, seepage.	Thin layer, piping.	Not needed	Rooting depth	Depth to rock, erodes easily.	Erodes easily, depth to rock.
938C*:						
Miami	Slope, seepage.	Piping	Not needed	Slope, erodes easily.	Favorable	Erodes easily.
Casco	Seepage	Seepage	Not needed	Droughty, slope.	Too sandy	Droughty.
938E*:						
Miami	Slope, seepage.	Piping	Not needed	Slope, erodes easily.	Slope	Slope, erodes easily.
Casco	Seepage	Seepage	Not needed	Droughty, slope.	Slope, too sandy.	Droughty, slope.
1103 Houghton	Seepage	Excess humus, low strength.	Frost action, excess humus.	Soil blowing, wetness, floods.	Not needed	Wetness.

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

TABLE 11.--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
24B Dodge	Slight	Slight	Moderate: slope.	Slight.
24C2 Dodge	Slight	Slight	Severe: slope.	Slight.
27B Miami	Slight	Slight	Moderate: slope.	Slight.
27C2 Miami	Slight	Slight	Severe: slope.	Slight.
27D2 Miami	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
27D3 Miami	Moderate: too clayey, slope.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
59 Lisbon	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
60C2 La Rose	Slight	Slight	Severe: slope.	Slight.
60D2 La Rose	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
62 Herbert	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
67 Harpster	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
69 Milford	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
76 Otter	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
82 Millington	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
93F* Rodman	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
103 Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.
104 Virgil	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
105A Batavia	Slight	Slight	Slight	Slight.
105B Batavia	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
125 Selma	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
134A Camden	Slight	Slight	Slight	Slight.
134B Camden	Slight	Slight	Moderate: slope.	Slight.
134C2 Camden	Slight	Slight	Severe: slope.	Slight.
145A Saybrook	Slight	Slight	Slight	Slight.
145B Saybrook	Slight	Slight	Moderate: slope.	Slight.
145C2 Saybrook	Slight	Slight	Severe: slope.	Slight.
146 Elliott	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
148A Proctor	Slight	Slight	Slight	Slight.
148B Proctor	Slight	Slight	Moderate: slope.	Slight.
149 Brenton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
152 Drummer	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
154 Flanagan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
171A Catlin	Slight	Slight	Slight	Slight.
171B Catlin	Slight	Slight	Moderate: slope.	Slight.
194B Morley	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
194C Morley	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
194D Morley	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
194E Morley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
198 Elburn	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
199A Plano	Slight	Slight	Slight	Slight.
199B Plano	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
206 Thorp	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
210 Lena	Severe: floods, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.	Severe: wetness, excess humus.
219 Millbrook	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
223B Varna	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
223C2 Varna	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
233A Birkbeck	Slight	Slight	Slight	Slight.
233B Birkbeck	Slight	Slight	Moderate: slope.	Slight.
233C2 Birkbeck	Slight	Slight	Severe: slope.	Slight.
236 Sabina	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
243A St. Charles	Slight	Slight	Slight	Slight.
243B St. Charles	Slight	Slight	Moderate: slope.	Slight.
290A Warsaw	Slight	Slight	Slight	Slight.
290B Warsaw	Slight	Slight	Moderate: slope.	Slight.
298 Beecher	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
318A Lorenzo	Slight	Slight	Slight	Slight.
318B Lorenzo	Slight	Slight	Moderate: slope.	Slight.
318C2 Lorenzo	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
323D Casco	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
323E Casco	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
325A Dresden	Slight	Slight	Slight	Slight.
325B Dresden	Slight	Slight	Moderate: slope.	Slight.
325C Dresden	Slight	Slight	Severe: slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
327A Fox	Slight	Slight	Slight	Slight.
327B Fox	Slight	Slight	Moderate: slope.	Slight.
327C Fox	Slight	Slight	Severe: slope.	Slight.
327D Fox	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
329 Will	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
330 Peotone	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.
343 Kane	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
344A Harvard	Slight	Slight	Slight	Slight.
344B Harvard	Slight	Slight	Moderate: slope.	Slight.
344C Harvard	Slight	Slight	Severe: slope.	Slight.
347 Canisteo	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
361B Kidder	Slight	Slight	Moderate: slope.	Slight.
361C Kidder	Slight	Slight	Severe: slope.	Slight.
361D Kidder	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
369A Waupecan	Slight	Slight	Slight	Slight.
369B Waupecan	Slight	Slight	Moderate: slope.	Slight.
392*:				
Urban land.				
Orthents.				
442 Mundelein	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
531B Markham	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
531C2 Markham	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
570B Martinsville	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
570C Martinsville	Slight	Slight	Severe: slope.	Slight.
656B Octagon	Slight	Slight	Moderate: slope.	Slight.
656C2 Octagon	Slight	Slight	Severe: slope.	Slight.
656D2 Octagon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
696B Zurich	Slight	Slight	Moderate: slope.	Slight.
697 Wauconda	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
791A Rush	Slight	Slight	Slight	Slight.
791B, 791C2 Rush	Slight	Slight	Moderate: slope.	Slight.
792A Bowes	Slight	Slight	Slight	Slight.
792B Bowes	Slight	Slight	Moderate: slope.	Slight.
792C Bowes	Slight	Slight	Severe: slope.	Slight.
864*, 865*. Pits				
921B*:				
Faxon	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.
Ripon	Slight	Slight	Moderate: depth to rock, slope.	Slight.
938C*:				
Miami	Slight	Slight	Severe: slope.	Slight.
Casco	Slight	Slight	Severe: slope.	Slight.
938E*:				
Miami	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Casco	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
1103 Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.

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

TABLE 12.--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
24B: Dodge	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
24C2: Dodge	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27B: Miami	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
27C2: Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27D2, 27D3: Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
59: Lisbon	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
60C2, 60D2: La Rose	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
62: Herbert	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
67: Harpster	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
69: Milford	Good	Fair	Fair	Fair	Fair	Poor	---	Fair	Fair	Poor.
76: Otter	Good	Fair	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
82: Millington	Good	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor.
93F*: Rodman	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
103: Houghton	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor.
104: Virgil	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
105A, 105B: Batavia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
125: Selma	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
134A, 134B: Camden	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
134C2: Camden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
145A, 145B: Saybrook	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
145C2: Saybrook	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
146----------------- Elliott	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
148A, 148B--------- Proctor	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
149----------------- Brenton	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
152----------------- Drummer	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
154----------------- Flanagan	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
171A, 171B--------- Catlin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
194B---------------- Morley	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
194C, 194D--------- Morley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
194E---------------- Morley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
198----------------- Elburn	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
199A, 199B--------- Plano	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
206----------------- Thorp	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Good.
210----------------- Lena	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
219----------------- Millbrook	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
223B---------------- Varna	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
223C2--------------- Varna	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
233A, 233B, 233C2-- Birkbeck	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
236----------------- Sabina	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
243A, 243B--------- St. Charles	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
290A, 290B--------- Warsaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
298----------------- Beecher	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
318A, 318B--------- Lorenzo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
318C2--------------- Lorenzo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
323D, 323E---------- Casco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
325A, 325B---------- Dresden	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
325C---------------- Dresden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
327A, 327B---------- Fox	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
327C, 327D---------- Fox	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
329----------------- Will	Fair	Good	Good	Good	Fair	Poor	Poor	Good	Good	Poor.
330----------------- Peotone	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
343----------------- Kane	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
344A, 344B---------- Harvard	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
344C---------------- Harvard	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
347----------------- Canisteo	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Poor	Good.
361B---------------- Kidder	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
361C---------------- Kidder	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
361D---------------- Kidder	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
369A, 369B---------- Waupecan	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
392*: Urban land.										
Orthents.										
442----------------- Mundelein	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
531B---------------- Markham	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
531C2--------------- Markham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
570B---------------- Martinsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
570C Martinsville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
656B Octagon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
656C2, 656D2 Octagon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
696B Zurich	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
697 Wauconda	Good	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor.
791A, 791B, 791C2 Rush	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
792A, 792B, 792C Bowes	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
864*, 865*. Pits										
921B*:										
Faxon	Fair	Fair	Fair	Poor	Poor	Good	Fair	Fair	Poor	Fair.
Ripon	Good	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
938C*:										
Miami	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Casco	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
938E*:										
Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Casco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
1103 Houghton	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.

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

TABLE 13.--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		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
24B, 24C2 Dodge	0-9	Silt loam	CL, CL-ML, ML	A-4	0	100	100	90-100	70-95	20-30	3-10
	9-24	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	90-100	70-95	35-55	15-25
	24-37	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0-2	90-100	85-95	75-95	45-60	30-45	15-25
	37-60	Gravelly loam, gravelly sandy loam, gravelly silt loam.	ML, CL, SM, SC	A-2, A-4	1-5	75-90	65-90	60-80	15-70	15-30	NP-10
27B, 27C2, 27D2 Miami	0-11	Silt loam	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	50-90	22-34	6-15
	11-29	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	92-99	89-97	78-95	64-95	35-50	17-31
	29-60	Loam, clay loam, sandy loam.	CL, CL-ML, ML	A-4, A-6	0-3	88-94	83-89	74-87	50-64	17-30	2-14
27D3 Miami	0-5	Clay loam	CL	A-6, A-7	0	100	90-100	75-95	65-95	30-45	15-25
	5-21	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	92-99	89-97	78-95	64-95	35-50	17-31
	21-60	Loam, clay loam, sandy loam.	CL, CL-ML, ML	A-4, A-6	0-3	88-94	83-89	74-87	50-64	17-30	2-14
59 Lisbon	0-13	Silt loam	ML, CL	A-6, A-7	0	100	100	95-100	80-95	35-50	10-20
	13-31	Silty clay loam	CL, CH	A-7, A-6	0	100	95-100	95-100	80-98	35-55	15-35
	31-60	Loam, clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0-5	90-100	90-100	85-100	70-95	20-45	8-25
60C2, 60D2 La Rose	0-7	Loam	ML, CL, OL	A-6, A-7	0	100	95-100	90-100	60-95	30-50	11-20
	7-20	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	60-95	30-50	11-25
	20-60	Loam, clay loam	CL	A-4, A-6	0-5	95-100	90-100	75-100	50-90	25-40	8-20
62 Herbert	0-12	Silt loam	ML, CL	A-6, A-7	0	100	100	95-100	85-100	35-50	11-30
	12-39	Silty clay loam, clay loam.	CL, CH	A-7, A-6	0	95-100	95-100	95-100	85-100	35-55	15-30
	39-60	Loam, silt loam	CL	A-6, A-4	0	95-100	90-100	85-100	60-90	25-40	8-25
67 Harpster	0-14	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	90-100	45-60	20-35
	14-40	Silty clay loam, silt loam, loam.	CL, CH	A-7	0	100	95-100	95-100	80-100	40-60	20-35
	40-60	Stratified sandy loam to clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-7	0	100	95-100	95-100	45-95	20-50	5-25
69 Milford	0-15	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	80-95	40-60	20-35
	15-47	Silty clay, silty clay loam, clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-100	40-60	20-40
	47-60	Stratified clay to sandy loam.	CL	A-6, A-7	0	97-100	95-100	90-100	70-100	30-50	15-30

TABLE 13.--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	
76----------------- Otter	0-39	Silt loam-------	CL	A-6, A-7	0	100	98-100	90-100	80-100	30-45	10-20
	39-60	Stratified silt loam to sandy loam.	CL, ML, SM, SC	A-4, A-6	0	90-100	80-100	55-95	45-85	20-40	3-20
82----------------- Millington	0-17	Loam------------	ML, CL, OL	A-6, A-7, A-4	0	90-100	90-100	80-100	70-95	30-45	8-17
	17-28	Loam, silty clay loam, clay loam.	CL, ML	A-7, A-6	0	95-100	90-100	80-100	70-95	28-50	10-22
	28-60	Stratified sandy loam to silty clay loam.	CL, ML, CL-ML	A-6, A-7, A-4	0	80-100	90-100	80-100	60-95	20-45	5-20
93F*--------------- Rodman	0-7	Gravelly sandy loam, sandy loam.	ML, CL, SM, GM	A-4	0-2	70-85	65-85	60-80	36-65	<30	3-9
	7-11	Gravelly loam, sandy loam, loam.	ML, CL-ML, SM-SC, SM	A-4, A-2, A-1	0-2	70-85	60-85	40-75	20-55	<25	NP-5
	11-60	Stratified sand to gravelly sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	---	NP
103---------------- Houghton	0-65	Sapric material	Pt	---	0	---	---	---	---	---	---
104---------------- Virgil	0-14	Silt loam-------	CL	A-4, A-6	0	100	100	90-100	70-95	20-35	8-20
	14-48	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	15-30
	48-60	Loam, sandy loam, clay loam.	CL, SC, SM-SC, CL-ML	A-2, A-4, A-6	0-5	90-100	85-100	70-100	30-90	20-35	5-15
105A, 105B--------- Batavia	0-11	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	23-38	5-15
	11-42	Silty clay loam	CL	A-6	0	100	100	95-100	90-100	27-47	12-28
	42-60	Stratified clay loam to sandy loam.	CL, SC, SM	A-2, A-4, A-6	0-5	90-100	80-90	60-90	30-70	10-25	4-15
125---------------- Selma	0-13	Loam------------	SC, CL	A-4, A-6	0	100	98-100	90-100	35-70	25-35	7-17
	13-40	Loam, clay loam, sandy clay loam.	CL, SC	A-6	0	100	95-100	90-100	38-75	24-36	11-19
	40-62	Stratified sand to silt loam.	CL, SC, SM, ML	A-4, A-6, A-2	0	90-100	85-100	65-100	18-67	<35	NP-21
134A, 134B, 134C2-- Camden	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	11-44	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	90-100	60-90	35-45	15-25
	44-60	Sandy loam, loam, silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-15
145A, 145B, 145C2-- Saybrook	0-18	Silt loam-------	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	11-30
	18-26	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	85-100	40-55	15-25
	26-60	Loam, silt loam, clay loam.	CL	A-6, A-4	0	95-100	85-100	80-95	60-85	20-40	8-25
146---------------- Elliott	0-12	Silt loam-------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	80-99	30-50	10-20
	12-28	Silty clay, silty clay loam.	CH, CL	A-6, A-7	0-5	95-100	95-100	90-100	75-99	30-52	11-26
	28-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-95	28-45	11-24

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
148A, 148B--------- Proctor	0-8	Silt loam-------	CL	A-6	0	100	100	95-100	85-100	25-40	10-22
	8-37	Silty clay loam, clay loam.	CL	A-7, A-6	0	95-100	90-100	85-100	65-90	25-50	10-25
	37-60	Stratified loam to sandy loam.	SC, CL, SM-SC, CL-ML	A-2, A-4, A-6	0	85-100	80-100	50-100	25-80	20-40	5-20
149---------------- Brenton	0-17	Silt loam-------	CL, ML	A-6, A-4	0	100	95-100	95-100	80-100	30-40	5-15
	17-33	Silty clay loam	CL, ML	A-6, A-7	0	100	95-100	95-100	75-95	35-50	10-25
	33-60	Stratified silt loam to sandy loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-2	0	95-100	85-100	80-100	30-85	20-35	5-20
152---------------- Drummer	0-13	Silty clay loam	CL	A-6, A-7	0	100	95-100	85-100	72-95	30-50	15-30
	13-43	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	95-100	85-100	50-80	30-50	15-30
	43-60	Stratified sandy loam to silty clay loam.	SC, CL	A-4, A-6	0-5	95-100	85-95	75-95	45-80	20-35	7-20
154---------------- Flanagan	0-15	Silt loam-------	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	15-42	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	42-60	Loam, clay loam, silt loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-7	0	85-100	80-100	70-100	36-100	20-45	5-30
171A, 171B--------- Catlin	0-13	Silt loam-------	ML, CL, OL	A-6, A-7	0	100	100	95-100	85-100	30-50	11-20
	13-43	Silty clay loam	CL, CH	A-7, A-6	0	100	100	90-100	80-100	35-60	20-30
	43-70	Loam, clay loam, silt loam.	CL	A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	11-20
194B, 194C, 194D, 194E--------------- Morley	0-10	Silt loam-------	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	90-100	85-95	25-40	5-15
	10-16	Silty clay loam, clay loam.	CL	A-6	0-10	95-100	90-100	85-95	80-90	25-40	10-20
	16-22	Silty clay, clay loam, clay.	CL, CH	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-55	15-30
	22-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-45	10-25
198---------------- Elburn	0-12	Silt loam-------	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	12-42	Silty clay loam	CL	A-6, A-7	0	100	100	100	75-90	30-50	15-35
	42-60	Loam, sandy loam, clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2	0	90-100	80-100	60-90	25-80	20-40	5-20
199A, 199B--------- Plano	0-15	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	15-43	Silty clay loam	CL	A-6	0	100	100	95-100	95-100	25-40	10-25
	43-60	Stratified sandy clay loam to loamy sand.	ML, SM, CL, SC	A-4, A-2	0-5	90-100	80-90	60-90	30-70	<25	NP-10
206---------------- Thorp	0-20	Silt loam-------	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	75-95	20-40	7-19
	20-54	Silty clay loam	CL	A-7, A-6	0	95-100	95-100	90-100	75-95	35-50	13-27
	54-63	Silt loam, clay loam, sandy clay loam.	CL	A-6, A-4, A-7	0	90-100	90-100	90-100	70-90	20-50	8-26
	63-70	Sandy loam, sand	SM, ML, CL-ML, SM-SC	A-2, A-4	0	85-100	75-95	65-85	20-60	<20	NP-6
210---------------- Lena	0-60	Sapric material	Pt	---	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
219----------------Millbrook	0-12	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	95-100	80-100	20-35	5-15
	12-29	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-98	30-45	10-25
	29-60	Stratified loamy sand to clay loam.	SM, SC, CL, ML	A-4, A-6, A-2	0-5	95-100	90-100	80-100	30-85	<30	NP-15
223B, 223C2--------Varna	0-11	Silt loam-------	CL	A-6, A-4	0-5	95-100	95-100	95-100	85-95	25-40	8-20
	11-30	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	95-100	90-98	80-98	33-56	15-29
	30-60	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	95-100	95-100	90-98	80-95	30-45	13-26
233A, 233B, 233C2--Birkbeck	0-14	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	28-40	5-15
	14-42	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	95-100	95-100	85-100	30-50	10-25
	42-60	Clay loam, loam, silt loam.	CL, ML	A-4, A-6, A-7	0-5	95-100	85-100	70-100	55-75	25-45	5-20
236----------------Sabina	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	11-45	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	11-25
	45-60	Clay loam, silty clay loam, silt loam.	CL	A-4, A-6, A-7	0-5	95-100	90-100	70-100	55-75	25-45	8-20
243A, 243B---------St. Charles	0-8	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-35	3-15
	8-41	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	41-65	Stratified silt loam to sandy clay loam.	ML, SC, SM, CL	A-2, A-4	0-5	90-100	80-90	60-90	30-70	<25	3-10
290A, 290B---------Warsaw	0-11	Loam------------	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	70-95	25-35	4-12
	11-24	Sandy clay loam, loam, gravelly clay loam.	SC, CL	A-6, A-2-6	0-3	90-95	70-95	60-90	30-70	25-35	10-20
	24-32	Gravelly sandy clay loam, gravelly loam.	CL, SC, GC	A-6, A-2-6	0-5	70-90	60-85	55-70	30-60	25-35	10-15
	32-60	Stratified sand to very gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	<20	NP
298----------------Beecher	0-11	Silt loam-------	ML	A-6, A-4, A-7	0	95-100	95-100	90-100	85-95	30-45	7-15
	11-35	Silty clay, silty clay loam.	CL	A-6, A-7	0	95-100	95-100	90-100	85-95	35-50	15-26
	35-60	Silty clay loam, clay loam.	CL	A-6	0-5	90-100	90-100	85-95	80-90	28-40	10-20
318A, 318B---------Lorenzo	0-13	Loam------------	CL, ML	A-6, A-7	0-5	95-100	95-100	85-100	60-95	30-50	10-20
	13-21	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-7	5-10	95-100	95-100	80-100	40-90	30-50	10-25
	21-60	Sand and gravel	GM, GC, SM, SC	A-1, A-2, A-3	5-20	25-80	25-80	10-70	5-35	<30	NP-10
318C2--------------Lorenzo	0-13	Clay loam-------	CL, ML	A-6, A-7	0-5	95-100	95-100	85-100	60-95	30-50	10-20
	13-21	Loam, clay loam, sandy clay loam.	CL, SC	A-6, A-7	5-10	95-100	95-100	80-100	40-90	30-50	10-25
	21-60	Sand and gravel	GM, GC, SM, SC	A-1, A-2, A-3	5-20	25-80	25-80	10-70	5-35	<30	NP-10

See footnote at end of table.

TABLE 13.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

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	
323D, 323E--------- Casco	0-8	Loam------------	ML, CL-ML, CL	A-4	0	95-100	90-100	75-100	50-75	20-30	3-10
	8-21	Clay loam, loam, sandy clay loam.	SC, CL, GC	A-6, A-7	0-5	60-100	55-100	55-90	35-70	25-45	11-25
	21-60	Sand and gravel	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-10	30-100	30-90	10-90	3-10	---	NP
325A, 325B, 325C--- Dresden	0-7	Silt loam-------	CL, CL-ML	A-6	0	100	100	95-100	85-100	20-40	5-15
	7-27	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	90-100	90-100	85-95	30-45	10-25
	27-32	Gravelly clay loam, sandy clay loam.	CL	A-6, A-7	0-5	95-100	90-100	90-100	85-95	30-45	10-25
	32-60	Sand and gravel	GP, GP-GM, SP, SP-SM	A-1	10-35	45-70	40-50	30-50	0-10	---	NP
327A, 327B, 327C, 327D-------------- Fox	0-9	Silt loam-------	ML, CL, CL-ML	A-4	0	95-100	85-100	75-95	55-90	20-30	3-10
	9-21	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	85-100	75-100	70-95	55-90	25-45	10-25
	21-34	Clay loam, loam, sandy clay loam, sandy loam.	CL, SC	A-2, A-6, A-7	0	85-100	75-95	50-95	20-65	25-45	10-25
	34-60	Sand and gravel	SP, SM, GP, GM	A-1, A-2, A-3	0-5	40-100	35-100	15-95	2-15	---	NP
329---------------- Will	0-11	Silty clay loam	CL, OH, CH, OL	A-7	0	95-100	95-100	90-100	80-95	45-60	20-35
	11-31	Loam, clay loam, silty clay loam, sandy loam.	CL, CH	A-7, A-6	0-5	90-100	90-100	80-100	60-90	35-60	20-35
	31-60	Stratified sand to gravelly loamy sand.	GP, SP, GP-GM, SP-SM	A-1	1-10	40-80	40-70	40-50	0-10	---	NP
330---------------- Peotone	0-14	Silty clay loam	OH, CH, CL, OL	A-7	0	100	95-100	95-100	80-100	40-65	15-35
	14-36	Silty clay loam, silty clay.	CH, CL	A-7	0-5	100	95-100	90-100	85-100	41-70	17-39
	36-60	Silty clay loam	CL, CH	A-7, A-6	0-5	95-100	95-100	90-100	75-98	30-60	14-29
343---------------- Kane	0-11	Silt loam-------	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	75-95	25-35	5-15
	11-28	Silty clay loam, clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-45	10-20
	28-33	Sandy clay loam, sandy loam.	SC, CL	A-6, A-4	0-5	90-95	85-95	70-90	40-70	20-35	8-15
	33-60	Gravelly loamy sand, sand, gravel.	SP, GP, SP-SM, GP-GM	A-1	0-10	30-70	30-55	10-30	2-12	<5	NP
344A, 344B, 344C--- Harvard	0-8	Silt loam-------	CL	A-4, A-6	0	100	95-100	90-100	85-100	30-40	8-16
	8-29	Silty clay loam	CL	A-6, A-7	0	100	90-100	90-100	85-100	25-45	11-25
	29-60	Stratified clay loam to sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-20

See footnote at end of table.

TABLE 13.--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	
347----------------- Canisteo	0-11	Loam------------	OL, CL	A-7	0	98-100	95-100	85-98	60-90	40-50	15-20
	11-35	Clay loam, loam	CL	A-6, A-7	0	98-100	90-100	85-95	65-85	38-50	25-35
	35-60	Clay loam, loam, sandy loam.	CL, ML, SM, SC	A-6, A-4	0-5	90-100	80-95	60-90	40-80	30-40	5-15
361B, 361C, 361D--- Kidder	0-8	Silt loam-------	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	60-90	20-30	3-10
	8-28	Clay loam, sandy clay loam, loam.	CL, SC	A-6, A-7	0-5	75-100	75-100	65-95	45-70	25-40	8-15
	28-60	Sandy loam, gravelly sandy loam.	SM	A-2	3-10	50-90	50-90	50-80	15-35	---	NP
369A, 369B--------- Waupecan	0-13	Silt loam-------	CL	A-4, A-6	0	100	100	90-100	85-95	20-35	8-15
	13-38	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	38-55	Stratified clay loam to gravelly loamy sand.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	65-90	50-70	25-65	<25	NP-15
	55-60	Sand and gravel	GP, SP, SP-SM, GP-GM	A-1	10-35	40-95	30-85	30-50	0-15	---	NP
392*:											
Urban land.											
Orthents.											
442---------------- Mundelein	0-12	Silt loam-------	ML, OL	A-4, A-6, A-7	0	95-100	95-100	95-100	85-95	30-50	5-20
	12-28	Silty clay loam	CL	A-7, A-6	0	95-100	95-100	95-100	75-95	35-50	15-25
	28-60	Stratified silt loam to fine sand.	SC, SM, ML, CL	A-2, A-4, A-6	0	90-100	90-100	60-90	10-75	<35	NP-20
531B, 531C2-------- Markham	0-7	Silt loam-------	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	90-100	85-95	23-40	6-17
	7-31	Silty clay, silty clay loam.	CL, CH	A-7	0-10	95-100	90-100	85-100	80-90	40-54	15-28
	31-60	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	95-100	90-100	85-95	80-90	30-45	13-26
570B, 570C--------- Martinsville	0-14	Loam------------	CL, CL-ML	A-4, A-6	0	100	90-100	80-100	60-90	22-33	4-12
	14-42	Clay loam, silty clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	90-100	65-90	40-90	20-35	8-17
	42-59	Sandy loam, silt loam, loam.	SM, ML	A-2-4, A-4	0	100	90-100	60-80	30-60	30-40	2-8
	59-70	Stratified sand to sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4	0	95-100	85-100	80-95	40-60	<25	4-9
656B, 656C2, 656D2- Octagon	0-13	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	13-30	Clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-95	75-95	65-95	35-50	15-30
	30-60	Loam------------	CL, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	20-30	5-15
696B--------------- Zurich	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	95-100	90-100	80-95	25-40	5-20
	12-31	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	90-100	60-90	30-45	10-25
	31-60	Stratified silt loam to fine sandy loam.	ML, CL, SM, SC	A-2, A-4, A-6	0	90-100	80-100	70-100	30-70	20-40	NP-20

See footnote at end of table.

TABLE 13.--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	
697----------------- Wauconda	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	20-35	6-15
	11-31	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	95-100	90-100	85-100	30-45	15-30
	31-60	Loam, silt loam, sand.	ML, CL, SM, SC	A-2, A-4, A-6	0	100	95-100	70-100	30-90	<30	NP-15
791A, 791B, 791C2-- Rush	0-11	Silt loam-------	CL	A-4, A-6	0	100	100	90-100	80-95	29-38	7-15
	11-41	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-95	44-52	21-26
	41-45	Clay loam, sandy clay loam, gravelly clay loam.	CL, SC	A-6, A-7, A-2	1-5	75-90	60-85	50-80	30-60	30-45	15-22
	45-60	Stratified sand to gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	<30	NP
792A, 792B, 792C--- Bowes	0-13	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-100	25-35	5-15
	13-43	Silty clay loam	CL	A-6, A-7	0	95-100	95-100	90-100	85-100	35-45	15-25
	43-51	Gravelly clay loam, gravelly sandy loam, gravelly loamy sand.	CL, SC, ML, SM	A-2, A-4, A-6	5-20	30-85	30-80	25-75	25-65	<30	NP-15
	51-60	Sand and gravel	SP, GP, SP-SM, GP-GM	A-1	5-35	30-70	25-70	25-50	0-10	<20	NP-3
864*, 865*. Pits											
921B*: Faxon--------------	0-13	Clay loam-------	CL	A-7	0-10	95-100	85-100	85-100	80-95	40-50	15-25
	13-28	Loam, sandy loam, clay loam.	CL, ML, SC, SM	A-7, A-6	0-10	95-100	70-100	65-95	40-85	30-50	10-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ripon--------------	0-13	Silt loam-------	ML, CL-ML	A-4	0	100	100	85-95	80-90	20-30	NP-5
	13-29	Silty clay loam, silt loam.	ML, CL	A-6, A-7	0	100	100	85-95	80-90	35-45	10-15
	29-32	Clay loam, sandy clay loam, loam.	ML, SM, SC, CL	A-6, A-7	0-5	90-100	90-100	60-80	45-60	35-45	10-15
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
938C*, 938E*: Miami--------------	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	50-90	22-34	6-15
	11-29	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	92-99	89-97	78-95	64-95	35-50	17-31
	29-60	Loam, clay loam, sandy loam.	CL, ML, CL-ML	A-4, A-6	0-3	88-94	83-89	74-87	50-64	17-30	2-14
Casco--------------	0-8	Loam------------	ML, CL, CL-ML	A-4	0	95-100	90-100	75-100	50-75	20-30	3-10
	8-21	Clay loam, loam, sandy clay loam.	SC, CL, GC	A-6, A-7	0-5	60-100	55-100	55-90	35-70	25-45	11-25
	21-60	Sand and gravel	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-10	30-100	30-90	10-90	3-10	---	NP
1103---------------- Houghton	0-65	Sapric material	Pt	---	0	---	---	---	---	---	---

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

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol > 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	Permea- bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH				
24B, 24C2-------- Dodge	0-9	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5
	9-24	0.6-2.0	0.18-0.22	5.1-6.5	Moderate------	0.37		
	24-37	0.6-2.0	0.16-0.19	5.1-6.5	Moderate------	0.37		
	37-60	0.6-2.0	0.07-0.20	7.9-8.4	Low-----------	0.37		
27B, 27C2, 27D2-- Miami	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	5	5
	11-29	0.6-2.0	0.15-0.20	5.6-6.0	Moderate------	0.37		
	29-60	0.6-2.0	0.05-0.19	6.6-8.4	Low-----------	0.37		
27D3------------- Miami	0-5	0.6-2.0	0.18-0.20	5.6-7.3	Moderate------	0.37	4	6
	5-21	0.6-2.0	0.15-0.20	5.6-6.0	Moderate------	0.37		
	21-60	0.6-2.0	0.05-0.19	6.6-8.4	Low-----------	0.37		
59--------------- Lisbon	0-13	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.28	4	6
	13-31	0.6-2.0	0.18-0.22	6.1-7.8	Moderate------	0.43		
	31-60	0.6-2.0	0.07-0.11	6.6-8.4	Low-----------	0.43		
60C2, 60D2------- La Rose	0-7	0.6-2.0	0.20-0.24	6.1-7.3	Low-----------	0.32	5	5
	7-20	0.6-2.0	0.15-0.20	5.6-7.8	Low-----------	0.32		
	20-60	0.6-2.0	0.07-0.09	7.4-8.4	Low-----------	0.32		
62--------------- Herbert	0-12	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.32	5	6
	12-39	0.6-2.0	0.15-0.20	5.6-8.4	Moderate------	0.43		
	39-60	0.6-2.0	0.17-0.19	7.4-8.4	Low-----------	0.43		
67--------------- Harpster	0-14	0.6-2.0	0.21-0.24	7.4-8.4	Moderate------	0.28	5	4L
	14-40	0.6-2.0	0.17-0.22	7.4-8.4	Moderate------	0.28		
	40-60	0.6-2.0	0.11-0.22	7.4-8.4	Low-----------	0.28		
69--------------- Milford	0-15	0.6-2.0	0.12-0.23	6.1-7.3	High----------	0.28	5	4
	15-47	0.2-0.6	0.11-0.20	6.6-7.8	High----------	0.28		
	47-60	0.2-0.6	0.14-0.20	7.4-8.4	Moderate------	0.28		
76--------------- Otter	0-39	0.6-2.0	0.22-0.24	6.1-7.8	Low-----------	0.28	5	6
	39-60	0.6-2.0	0.12-0.21	6.6-8.4	Low-----------	0.28		
82--------------- Millington	0-17	0.6-2.0	0.20-0.24	7.4-8.4	Low-----------	0.28	5	5
	17-28	0.6-2.0	0.17-0.20	7.4-8.4	Moderate------	0.28		
	28-60	0.6-2.0	0.14-0.20	7.4-8.4	Moderate------	0.28		
93F*------------- Rodman	0-7	2.0-6.0	0.10-0.12	6.6-7.8	Low-----------	0.20	3	8
	7-11	2.0-6.0	0.09-0.12	6.6-7.8	Low-----------	0.17		
	11-60	>20	0.02-0.04	7.4-8.4	Low-----------	0.10		
103-------------- Houghton	0-65	0.2-6.0	0.35-0.45	5.6-7.3	--------------	---	---	3
104-------------- Virgil	0-14	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.32	5	6
	14-48	0.2-2.0	0.18-0.20	5.1-6.5	Moderate------	0.43		
	48-60	0.6-6.0	0.11-0.19	6.6-8.4	Low-----------	0.28		
105A, 105B------- Batavia	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	5	6
	11-42	0.6-2.0	0.18-0.20	5.1-6.5	Moderate------	0.43		
	42-60	0.6-6.0	0.11-0.20	5.6-7.3	Low-----------	0.43		
125-------------- Selma	0-13	0.6-2.0	0.17-0.22	6.1-7.8	Moderate------	0.28	5	6
	13-40	0.6-2.0	0.15-0.19	6.1-7.8	Moderate------	0.28		
	40-62	0.6-6.0	0.05-0.22	6.1-7.8	Low-----------	0.28		
134A, 134B, 134C2----------- Camden	0-11	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.37	5	6
	11-44	0.6-2.0	0.16-0.20	5.1-6.5	Moderate------	0.37		
	44-60	0.6-6.0	0.12-0.18	5.6-7.3	Low-----------	0.37		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH				
145A, 145B, 145C2----------- Saybrook	0-18	0.6-2.0	0.21-0.24	5.6-7.3	Low-----------	0.32	5	6
	18-26	0.6-2.0	0.18-0.20	5.6-6.5	Moderate------	0.43		
	26-60	0.6-2.0	0.08-0.11	6.1-8.4	Low-----------	0.43		
146-------------- Elliott	0-12	0.6-2.0	0.21-0.24	5.6-7.3	Moderate------	0.28	4	6
	12-28	0.2-0.6	0.11-0.20	5.6-7.8	Moderate------	0.28		
	28-60	0.2-0.6	0.14-0.20	7.4-8.4	Moderate------	0.28		
148A, 148B------- Proctor	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6
	8-37	0.6-2.0	0.15-0.20	5.6-6.5	Moderate------	0.43		
	37-60	0.6-6.0	0.07-0.19	6.1-7.3	Low-----------	0.43		
149-------------- Brenton	0-17	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.28	5	6
	17-33	0.6-2.0	0.18-0.20	5.6-6.5	Moderate------	0.28		
	33-60	0.6-2.0	0.11-0.20	6.1-8.4	Low-----------	0.28		
152-------------- Drummer	0-13	0.6-2.0	0.21-0.23	5.6-7.3	Moderate------	0.28	5	7
	13-43	0.6-2.0	0.21-0.24	5.6-7.3	Moderate------	0.28		
	43-60	0.6-2.0	0.11-0.19	6.6-8.4	Low-----------	0.28		
154-------------- Flanagan	0-15	0.6-2.0	0.22-0.24	5.6-7.3	Moderate------	0.28	5	6
	15-42	0.6-2.0	0.15-0.22	5.6-7.3	High----------	0.43		
	42-60	0.6-2.0	0.15-0.22	6.1-8.4	Low-----------	0.43		
171A, 171B------- Catlin	0-13	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6
	13-43	0.6-2.0	0.18-0.20	5.6-7.3	Moderate------	0.43		
	43-70	0.6-2.0	0.07-0.11	6.6-8.4	Low-----------	0.43		
194B, 194C, 194D, 194E------------ Morley	0-10	0.6-2.0	0.20-0.24	5.1-6.5	Low-----------	0.43	3	6
	10-16	0.2-0.6	0.18-0.20	5.1-6.5	Moderate------	0.43		
	16-22	0.06-0.2	0.11-0.13	5.6-6.5	Moderate------	0.43		
	22-60	0.2-0.6	0.09-0.20	6.6-8.4	Moderate------	0.43		
198-------------- Elburn	0-12	0.6-2.0	0.22-0.24	5.6-7.8	Low-----------	0.28	5	6
	12-42	0.6-2.0	0.18-0.20	5.6-7.8	Moderate------	0.43		
	42-60	0.6-6.0	0.12-0.18	6.1-8.4	Low-----------	0.43		
199A, 199B------- Plano	0-15	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.32	5	6
	15-43	0.6-2.0	0.18-0.20	5.6-7.3	Moderate------	0.43		
	43-60	0.6-6.0	0.11-0.22	6.6-8.4	Low-----------	0.43		
206-------------- Thorp	0-20	0.2-0.6	0.22-0.24	5.1-7.3	Low-----------	0.37	4	6
	20-54	0.06-0.2	0.18-0.20	5.6-6.5	Moderate------	0.37		
	54-63	0.06-0.2	0.15-0.22	6.6-7.3	Moderate------	0.37		
	63-70	2.0-6.0	0.05-0.13	7.4-8.4	Low-----------	0.37		
210-------------- Lena	0-60	0.2-6.0	0.35-0.45	7.4-8.4	--------------	---	---	3
219-------------- Millbrook	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6
	12-29	0.2-2.0	0.15-0.20	5.6-7.3	Moderate------	0.43		
	29-60	0.2-2.0	0.11-0.22	6.1-8.4	Low-----------	0.32		
223B, 223C2------ Varna	0-11	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.32	4	6
	11-30	0.2-0.6	0.09-0.19	5.6-7.3	Moderate------	0.32		
	30-60	0.06-0.6	0.14-0.20	6.6-8.4	Low-----------	0.32		
233A, 233B, 233C2----------- Birkbeck	0-14	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.37	5	6
	14-42	0.6-2.0	0.18-0.22	5.1-6.5	Moderate------	0.37		
	42-60	0.6-2.0	0.14-0.20	5.6-6.5	Low-----------	0.37		
236-------------- Sabina	0-11	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.37	5	6
	11-45	0.2-2.0	0.18-0.20	5.6-7.3	Moderate------	0.37		
	45-60	0.2-2.0	0.07-0.11	7.4-8.4	Low-----------	0.37		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH				
243A, 243B-------	0-8	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.37	5	6
St. Charles	8-41	0.6-2.0	0.18-0.20	5.1-7.3	Moderate------	0.37		
	41-65	0.6-6.0	0.11-0.22	5.6-7.8	Low-----------	0.37		
290A, 290B-------	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	4	5
Warsaw	11-24	0.6-2.0	0.16-0.19	5.1-7.3	Low-----------	0.28		
	24-32	0.6-2.0	0.15-0.17	6.6-8.4	Low-----------	0.28		
	32-60	>20	0.02-0.04	7.9-8.4	Low-----------	0.10		
298--------------	0-11	0.2-0.6	0.22-0.24	4.5-6.0	Low-----------	0.37	3	6
Beecher	11-35	0.06-0.2	0.11-0.19	4.5-6.5	Moderate------	0.37		
	35-60	0.06-0.2	0.14-0.20	7.4-8.4	Moderate------	0.37		
318A, 318B, 318C2-----------	0-13	2.0-6.0	0.20-0.22	5.6-7.3	Low-----------	0.28	3	5
Lorenzo	13-21	2.0-6.0	0.15-0.19	5.6-7.3	Low-----------	0.28		
	21-60	>6.0	0.02-0.07	7.4-8.4	Low-----------	0.10		
323D, 323E-------	0-8	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	3	5
Casco	8-21	0.6-2.0	0.12-0.19	5.6-7.8	Moderate------	0.32		
	21-60	>20	0.02-0.04	7.4-8.4	Low-----------	0.10		
325A, 325B, 325C-	0-7	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	4	6
Dresden	7-27	0.6-2.0	0.15-0.20	5.6-7.3	Moderate------	0.28		
	27-32	0.6-2.0	0.15-0.20	5.6-7.3	Moderate------	0.28		
	32-60	6.0-20	0.02-0.04	7.4-8.4	Low-----------	0.10		
327A, 327B, 327C, 327D------------	0-9	0.6-2.0	0.20-0.24	5.1-6.5	Low-----------	0.37	4	5
Fox	9-21	0.6-2.0	0.15-0.22	5.1-6.5	Moderate------	0.37		
	21-34	0.6-2.0	0.15-0.19	6.1-7.8	Moderate------	0.37		
	34-60	>6.0	0.02-0.04	7.9-8.4	Low-----------	0.10		
329--------------	0-11	0.6-2.0	0.17-0.23	5.6-7.3	Moderate------	0.28	4	7
Will	11-31	0.6-2.0	0.15-0.20	6.1-7.3	Moderate------	0.28		
	31-60	6.0-20	0.02-0.04	7.9-8.4	Low-----------	0.10		
330--------------	0-14	0.2-0.6	0.12-0.23	5.6-6.5	High----------	0.28	5	4
Peotone	14-36	0.2-0.6	0.11-0.20	6.1-7.8	High----------	0.28		
	36-60	0.06-0.2	0.18-0.20	6.6-8.4	High----------	0.28		
343--------------	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.28	4	5
Kane	11-28	0.6-2.0	0.15-0.20	5.6-7.3	Moderate------	0.28		
	28-33	0.6-6.0	0.12-0.18	6.1-7.8	Low-----------	0.28		
	33-60	6.0-20	0.02-0.04	7.9-8.4	Very low------	0.10		
344A, 344B, 344C-	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	6
Harvard	8-29	0.6-2.0	0.15-0.20	5.1-7.3	Moderate------	0.43		
	29-60	0.6-6.0	0.03-0.10	5.6-7.8	Low-----------	0.43		
347--------------	0-11	0.6-2.0	0.18-0.22	7.4-8.4	Moderate------	0.28	5	4L
Canisteo	11-35	0.6-2.0	0.15-0.19	7.4-8.4	Moderate------	0.28		
	35-60	0.6-2.0	0.12-0.18	7.4-8.4	Low-----------	0.28		
361B, 361C, 361D-	0-8	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.32	5	5
Kidder	8-28	0.6-2.0	0.15-0.19	5.6-7.8	Moderate------	0.32		
	28-60	2.0-6.0	0.09-0.11	7.4-7.8	Low-----------	0.32		
369A, 369B-------	0-13	0.6-2.0	0.22-0.24	5.1-6.5	Low-----------	0.32	4	6
Waupecan	13-38	0.6-2.0	0.18-0.22	5.6-6.5	Moderate------	0.43		
	38-55	2.0-6.0	0.08-0.18	6.1-7.8	Low-----------	0.10		
	55-60	>20	0.02-0.04	7.9-8.4	Low-----------	0.10		
392*:								
Urban land.								
Orthents.								

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	In/hr	In/in	pH				
442----------------- Mundelein	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.28	5	6
	12-28	0.2-2.0	0.18-0.20	5.6-7.3	Moderate------	0.43		
	28-60	0.2-2.0	0.05-0.22	6.1-8.4	Low-----------	0.43		
531B, 531C2------ Markham	0-7	0.6-2.0	0.22-0.24	5.6-6.5	Low-----------	0.37	3	6
	7-31	0.06-0.6	0.11-0.20	5.1-7.8	Moderate------	0.37		
	31-60	0.06-0.6	0.14-0.20	7.4-8.4	Moderate------	0.37		
570B, 570C------- Martinsville	0-14	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	5	5
	14-42	0.6-2.0	0.17-0.20	5.1-6.0	Moderate------	0.37		
	42-59	0.6-2.0	0.12-0.14	5.6-6.5	Low-----------	0.24		
	59-70	2.0-6.0	0.19-0.21	7.4-8.4	Low-----------	0.24		
656B, 656C2, 656D2----------- Octagon	0-13	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.32	5	5
	13-30	0.6-2.0	0.15-0.20	5.6-8.4	Moderate------	0.32		
	30-60	0.6-2.0	0.05-0.19	7.9-8.4	Low-----------	0.32		
696B------------- Zurich	0-12	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.37	5	6
	12-31	0.6-2.0	0.18-0.22	4.5-7.8	Moderate------	0.37		
	31-60	0.6-6.0	0.14-0.22	7.4-8.4	Low-----------	0.37		
697-------------- Wauconda	0-11	0.6-2.0	0.22-0.24	6.1-7.3	Low-----------	0.32	4	5
	11-31	0.6-2.0	0.18-0.20	5.6-7.8	Moderate------	0.43		
	31-60	0.6-6.0	0.05-0.22	7.4-8.4	Low-----------	0.32		
791A, 791B, 791C2----------- Rush	0-11	0.6-2.0	0.22-0.24	5.1-6.0	Low-----------	0.37	5	5
	11-41	0.6-2.0	0.18-0.20	5.6-6.0	Moderate------	0.37		
	41-45	0.6-2.0	0.15-0.19	5.6-7.3	Moderate------	0.37		
	45-60	>20	0.02-0.04	7.4-8.4	Low-----------	0.10		
792A, 792B, 792C- Bowes	0-13	0.6-2.0	0.21-0.24	5.6-7.3	Low-----------	0.32	5	6
	13-43	0.6-2.0	0.18-0.20	5.1-6.5	Moderate------	0.43		
	43-51	0.6-6.0	0.10-0.16	6.6-7.8	Low-----------	0.17		
	51-60	6.0-20	0.02-0.04	7.9-8.4	Low-----------	0.10		
864*, 865* Pits								
921B*:								
Faxon-----------	0-13	0.6-2.0	0.17-0.22	6.6-7.8	Moderate------	0.28	4	6
	13-28	0.6-2.0	0.12-0.19	6.6-7.8	Moderate------	0.28		
	28	---	---	---	--------------	---		
Ripon-----------	0-13	0.6-2.0	0.20-0.22	5.6-7.8	Low-----------	0.32	4	5
	13-29	0.6-2.0	0.18-0.20	5.6-6.0	Moderate------	0.43		
	29-32	0.6-2.0	0.16-0.18	7.9-8.4	Moderate------	0.43		
	32	---	---	---	--------------	---		
938C*, 938E*:								
Miami-----------	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.37	5	5
	11-29	0.6-2.0	0.15-0.20	5.6-6.0	Moderate------	0.37		
	29-60	0.2-2.0	0.05-0.19	6.6-8.4	Low-----------	0.37		
Casco-----------	0-8	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	3	5
	8-21	0.6-2.0	0.12-0.19	5.6-7.8	Moderate------	0.32		
	21-60	>20	0.02-0.04	7.4-8.4	Low-----------	0.10		
1103------------- Houghton	0-65	0.2-6.0	0.35-0.45	5.6-7.3	--------------	---	---	3

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

TABLE 15.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain such terms as "rare," "brief," and "perched." The symbol > means greater than]

Soil name and map symbol	Hydrologic 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				
24B, 24C2--------- Dodge	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Moderate.
27B, 27C2, 27D2, 27D3------------- Miami	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Moderate.
59---------------- Lisbon	B	None---------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
60C2, 60D2-------- La Rose	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Moderate.
62---------------- Herbert	B	None---------	---	---	1.0-3.0	Apparent	Mar-May	>60	---	High-----	High-----	Moderate.
67---------------- Harpster	B/D	Occasional--	Brief-----	Mar-Jun	0-2.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Low.
69---------------- Milford	B/D	Occasional--	Brief-----	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
76---------------- Otter	B/D	Frequent----	Brief-----	Apr-Jun	0-2.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Low.
82---------------- Millington	B	Frequent----	Brief-----	Apr-Jun	0-2.0	Apparent	Mar-Jul	>60	---	High-----	High-----	Low.
93F*-------------- Rodman	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
103--------------- Houghton	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
104--------------- Virgil	B	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
105A, 105B-------- Batavia	B	None---------	---	---	>3.0	Apparent	Mar-May	>60	---	High-----	High-----	Moderate.
125--------------- Selma	B/D	Occasional--	Brief-----	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
134A, 134B, 134C2- Camden	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
145A, 145B, 145C2- Saybrook	B	None---------	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.

See footnote at end of table.

TABLE 15.--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				
146----------------- Elliott	C	None--------	---	---	1.0-3.0	Perched-	Mar-May	>60	---	High-----	High-----	Moderate.
148A, 148B--------- Proctor	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Moderate.
149----------------- Brenton	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
152----------------- Drummer	B/D	Occasional--	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
154----------------- Flanagan	B	None--------	---	---	1.0-3.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Moderate.
171A, 171B--------- Catlin	B	None--------	---	---	3.5-6.0	Apparent	Feb-May	>60	---	High-----	High-----	Moderate.
194B, 194C, 194D, 194E-------------- Morley	C	None--------	---	---	3.0-6.0	Perched-	Mar-May	>60	---	Moderate-	High-----	Moderate.
198----------------- Elburn	B	None--------	---	---	1.0-3.0	Apparent	Jan-May	>60	---	High-----	High-----	Moderate.
199A, 199B--------- Plano	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Low.
206----------------- Thorp	C/D	Occasional--	Brief-----	Mar-Jun	0-2.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Moderate.
210----------------- Lena	A/D	Frequent----	Long------	Nov-Jun	0-1.0	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
219----------------- Millbrook	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
223B, 223C2-------- Varna	C	None--------	---	---	3.0-6.0	Perched-	Mar-May	>60	---	High-----	Moderate-	Moderate.
233A, 233B, 233C2- Birkbeck	B	None--------	---	---	2.5-6.0	Apparent	Mar-May	>60	---	High-----	High-----	Moderate.
236----------------- Sabina	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
243A, 243B--------- St. Charles	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Moderate.
290A, 290B--------- Warsaw	B	None--------	---	---	>6.0	---	---	>60	---	Moderate-	Low------	Moderate.
298----------------- Beecher	C	None--------	---	---	1.0-3.0	Perched-	Mar-Jun	>60	---	High-----	High-----	High.

See footnote at end of table.

TABLE 15.--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				
318A, 318B, 318C2-- Lorenzo	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate-	Moderate.
323D, 323E--------- Casco	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Low-------	Low.
325A, 325B, 325C--- Dresden	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Low.
327A, 327B, 327C, 327D------------- Fox	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Low-------	Moderate.
329---------------- Will	B/D	Occasional--	Brief------	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High------	High------	Moderate.
330---------------- Peotone	B/D	Occasional--	Long-------	Feb-Jul	0-1.0	Perched-	Feb-Jul	>60	---	High------	High------	Moderate.
343---------------- Kane	B	None---------	---	---	1.0-3.0	Apparent	Feb-Jun	>60	---	High------	High------	Moderate.
344A, 344B, 344C--- Harvard	B	None---------	---	---	4.0-6.0	Apparent	Feb-May	>60	---	High------	High------	Moderate.
347---------------- Canisteo	C/D	Common-------	Brief------	Mar-Jun	0-3.0	Apparent	Nov-Jun	>60	---	High------	High------	Low.
361B, 361C, 361D--- Kidder	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Low.
369A, 369B--------- Waupecan	B	None---------	---	---	>6.0	---	---	>60	---	High------	Moderate-	Moderate.
392*:												
Urban land.												
Orthents.												
442---------------- Mundelein	B	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High------	High------	Moderate.
531B, 531C2-------- Markham	C	None---------	---	---	3.0-6.0	Perched-	Mar-May	>60	---	High------	Moderate-	Moderate.
570B, 570C--------- Martinsville	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Moderate.
656B, 656C2, 656D2------------- Octagon	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Moderate.
696B--------------- Zurich	B	None---------	---	---	4.0-6.0	Apparent	Feb-Apr	>60	---	High------	Moderate-	Moderate.

See footnote at end of table.

TABLE 15.--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				
697---------------- Wauconda	B	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
791A, 791B, 791C2- Rush	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Moderate.
792A, 792B, 792C-- Bowes	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate-	Moderate.
864*, 865*. Pits												
921B*:												
Faxon-------------	B/D	Common------	Very brief	Apr-May	0-1.0	Apparent	Nov-May	20-40	Hard----	High-----	High-----	Low.
Ripon-------------	B	None---------	---	---	>6.0	---	---	20-40	Hard----	High-----	Moderate-	Moderate.
938C*, 938E*:												
Miami-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Moderate-	Moderate.
Casco-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate-	Low------	Low.
1103--------------- Houghton	A/D	Frequent----	Long------	Nov-May	0-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.

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

TABLE 16.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Batavia	Fine-silty, mixed, mesic Mollic Hapludalfs
Beecher	Fine, illitic, mesic Udollic Ochraqualfs
Birkbeck	Fine-silty, mixed, mesic Typic Hapludalfs
Bowes	Fine-silty, mixed, mesic Mollic Hapludalfs
Brenton	Fine-silty, mixed, mesic Aquic Argiudolls
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Canisteo	Fine-loamy, mixed (calcareous), mesic Typic Haplaquolls
Casco	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Catlin	Fine-silty, mixed, mesic Typic Argiudolls
Dodge	Fine-silty, mixed, mesic Typic Hapludalfs
Dresden	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
Elliott	Fine, illitic, mesic Aquic Argiudolls
Faxon	Fine-loamy, mixed, mesic Typic Haplaquolls
Flanagan	Fine, montmorillonitic, mesic Aquic Argiudolls
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Harpster	Fine-silty, mesic Typic Calciaquolls
Harvard	Fine-silty, mixed, mesic Mollic Hapludalfs
Herbert	Fine-silty, mixed, mesic Udollic Ochraqualfs
Houghton	Euic, mesic Typic Medisaprists
Kane	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Argiudolls
Kidder	Fine-loamy, mixed, mesic Typic Hapludalfs
La Rose	Fine-loamy, mixed, mesic Typic Argiudolls
Lena	Euic, mesic Typic Medisaprists
Lisbon	Fine-silty, mixed, mesic Aquic Argiudolls
Lorenzo	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Markham	Fine, illitic, mesic Mollic Hapludalfs
Martinsville	Fine-loamy, mixed, mesic Typic Hapludalfs
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
Milford	Fine, mixed, mesic Typic Haplaquolls
Millbrook	Fine-silty, mixed, mesic Udollic Ochraqualfs
Millington	Fine-loamy, mixed (calcareous), mesic Cumulic Haplaquolls
Morley	Fine, illitic, mesic Typic Hapludalfs
Mundelein	Fine-silty, mixed, mesic Aquic Argiudolls
Octagon	Fine-loamy, mixed, mesic Mollic Hapludalfs
Otter	Fine-silty, mixed, mesic Cumulic Haplaquolls
Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Plano	Fine-silty, mixed, mesic Typic Argiudolls
Proctor	Fine-silty, mixed, mesic Typic Argiudolls
Ripon	Fine-silty, mixed, mesic Typic Argiudolls
Rodman	Sandy-skeletal, mixed, mesic Typic Hapludolls
Rush	Fine-silty, mixed, mesic Typic Hapludalfs
Sabina	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Saybrook	Fine-silty, mixed, mesic Typic Argiudolls
Selma	Fine-loamy, mixed, mesic Typic Haplaquolls
St. Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Thorp	Fine-silty, mixed, mesic Argiaquic Argialbolls
Varna	Fine, illitic, mesic Typic Argiudolls
Virgil	Fine-silty, mixed, mesic Udollic Ochraqualfs
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Wauconda	Fine-silty, mixed, mesic Udollic Ochraqualfs
Waupecan	Fine-silty, mixed, mesic Typic Argiudolls
Will	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplaquolls
Zurich	Fine-silty, mixed, mesic Typic Hapludalfs

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